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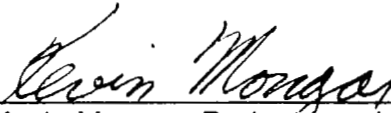
Ambient Air Monitoring
for Methyl Bromide and 1,3-Dichloropropene
in Monterey/Santa Cruz Counties – Fall 2000

Testing Section
Engineering and Certification Branch
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Executive Summary

Ambient Air Monitoring for Methyl Bromide and 1,3-Dichloropropene in Monterey/Santa Cruz Counties - Fall 2000

In November 1999, the California Department of Pesticide Regulation (DPR) requested that the Air Resources Board (ARB) conduct ambient air monitoring for the soil fumigants methyl bromide and 1,3-dichloropropene (also known as Telone). Monitoring was conducted in Monterey and Santa Cruz Counties from September 11, 2000 through November 3, 2000, to coincide with the use of the two soil fumigants prior to planting of a variety of crops. The sampling site selection specifically focused on areas of historical use of methyl bromide prior to planting strawberries. Two sites were selected for monitoring based on their proximity to historic use of 1,3-dichloropropene.

Ambient air samples were collected at four sites in Monterey County and one site in Santa Cruz County; urban background samples were also collected in Salinas (Monterey County). Samples of 24 hours in duration were collected Monday through Friday at each site throughout the monitoring period. Thirty-one sampling days were monitored at each site for a total of 186 (6 sites x 31) sampling days. Results from seven canister samples were not reported due to either sampling problems or laboratory error.

Air samples for methyl bromide and 1,3-dichloropropene were collected using evacuated 6 liter Silcosteel® canisters (i.e., each canister sample was analyzed for both compounds). Sampling for both fumigants was also conducted for one week using charcoal tubes, which had been used in prior sampling for these fumigants. Canister and 1,3-dichloropropene charcoal tube samples were analyzed using gas chromatography with a mass selective detector. Methyl bromide charcoal tube samples were analyzed using gas chromatography with an electron capture detector.

Methyl Bromide Results

Concentrations of methyl bromide in canister samples were measured as high as 119 micrograms per cubic meter of sampled air ($\mu\text{g}/\text{m}^3$). This concentration was measured at the Pajaro Middle School near the town of Watsonville. Methyl bromide was used in the Watsonville area as associated with growing strawberries. The highest average concentration for the eight-week canister monitoring period was $28.9 \mu\text{g}/\text{m}^3$, also measured at the Pajaro Middle School site. All of the 179 ambient canister samples contained concentrations of methyl bromide above the estimated quantitation limit (reporting limit) of $0.036 \mu\text{g}/\text{m}^3$. The methyl bromide charcoal tube monitoring included 24 sampling periods (6 sites x 4 sampling days each) but samples for eight periods were not submitted for analysis due to sampling problems and results for six additional periods were uncertain due to laboratory error. The analytical method for the charcoal

tube sampling had a reporting limit of 28 ug/m^3 , considerably less sensitive than the canister reporting limits. None of the remaining 10 sampling periods had results above this charcoal tube reporting limit. The canister results for these 10 sampling periods were all below the charcoal tube reporting limit of 28 ug/m^3 .

1,3-Dichloropropene Results

Concentrations of 1,3-dichloropropene were measured as high as $4.3 \text{ } \mu\text{g/m}^3$. This concentration was measured at the Chualar School site in the small town of Chualar. The highest average concentration for the eight-week monitoring period was $0.4 \text{ } \mu\text{g/m}^3$, also measured at the Chualar School site. Of the 179 ambient canister samples, 41 contained concentrations of 1,3-dichloropropene above the estimated quantitation limit of about $0.05 \text{ } \mu\text{g/m}^3$. For sampling periods that used canisters and charcoal tubes at the same sites, results generally correlated.

Acknowledgments

Assistance in sampling site selection was provided by Patty Murrey of the Monterey County Agricultural Commissioner's Office and Rick Bergman of the Santa Cruz County Agricultural Commissioner's Office. Staff of the ARB Air Quality Surveillance Branch (AQSB) collected the ambient samples. Jack Romans of the AQSB prepared site reports and the descriptions of fumigant use near the sites during the study. Jim Omand, Mike Orbanosky and T. E. Houston of the ARB Special Analysis Section laboratory performed the method development and chemical analyses. Paul Lee of the California Department of Food and Agriculture Center for Analytical Chemistry performed analyses of methyl bromide charcoal tube samples. Neil Adler of the ARB Air Monitoring North Section prepared the sampling tree diagrams presented in this report. Lynn Baker of the ARB Stationary Source Division provided helpful advice and suggestions in regard to project planning and the monitoring protocol and report.

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Ambient Air Monitoring
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I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (June 16, 2000 memorandum, Sanders to Lew), the Air Resources Board (ARB) staff determined airborne concentrations of the pesticides methyl bromide (bromomethane) and 1,3-dichloropropene (also referred to as Telone II or Telone). Monitoring was conducted in Monterey/Santa Cruz Counties from September 11, 2000 through November 3, 2000, to coincide with the use of the two soil fumigants prior to planting of a variety of crops. The sampling site selection specifically focused on areas of historical use of methyl bromide prior to planting strawberries. Two sites were selected for monitoring based on their proximity to historical use of 1,3-dichloropropene. This monitoring was done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The ARB Special Analysis Section laboratory conducted the method development and sample analyses. Staff of the California Department of Food and Agriculture (CDFA) Center for Analytical Chemistry performed analyses of methyl bromide charcoal tube samples. The ARB Air Quality Surveillance Branch staff conducted sample collection for the ambient study. Additional monitoring for methyl bromide and 1,3-dichloropropene in Kern County was described in a separate report to the DPR dated December 2000. Similar monitoring studies for the fumigants are scheduled for 2001.

The protocol for the ambient air monitoring for methyl bromide and 1,3-dichloropropene is enclosed separately as Appendix I (page 1 of a separate volume of appendices to this report).

The laboratory report, "1,3-Dichloropropene (Telone) and Bromomethane Method Development and Analytical Results for Ambient Monitoring Samples Collected in 6 liter Silco™ Canisters in Monterey County", is enclosed separately as Appendix II (page 78 of the separate volume of appendices to this report). The canister sampling/analysis Standard Operating Procedures (SOP) are also enclosed in Appendix II (pages 106 and 112 of the separate volume of appendices to this report).

The laboratory report, "1,3-Dichloropropene (Telone) Charcoal Tube Method Development and Analytical Results for Ambient Monitoring Samples", is enclosed separately as Appendix III (page 129 of the separate volume of appendices to this report). The charcoal tube sampling/analysis Standard Operating Procedures (SOP) are also enclosed in Appendix III (page 147 of the separate volume of appendices to this report).

The CDFA Center for Analytical Chemistry laboratory results for analyses of methyl bromide charcoal tube samples are enclosed separately as Appendix IV (page 153 of the separate volume of appendices to this report). The charcoal tube sampling/analysis Standard Operating Procedures (SOP) are enclosed in Appendix I (page 62 of the separate volume of appendices to this report).

The DPR's June 16, 2000 memorandum, "Use Information and Air Monitoring Recommendation for the Pesticide Active Ingredients 1,3 Dichloropropene and Methyl Bromide," is enclosed separately as Appendix V (page 157 of the separate volume of appendices to this report).

The canister ambient field log sheets are enclosed separately as Appendix VI (page 182 of the separate volume of appendices to this report).

The 1,3-dichloropropene charcoal tube field log sheets are enclosed separately as Appendix VII (page 198 of the separate volume of appendices to this report).

The methyl bromide charcoal tube ambient field log sheets are enclosed separately as Appendix VIII (page 201 of the separate volume of appendices to this report).

II. Chemical Properties of Methyl Bromide and 1,3-dichloropropene

Information regarding the chemical properties of methyl bromide and 1,3-dichloropropene is summarized in the DPR's June 16, 2000 memorandum, "Use Information and Air Monitoring Recommendation for the Pesticide Active Ingredient Methyl bromide and 1,3-dichloropropene" (page 157 of appendices). The technical product for 1,3-dichloropropene (e.g., Telone II) is a mixture of approximately equal quantities of the cis (z) and trans (e) isomers of which the cis-isomer is more nematocidally active.

III. Sampling

The primary procedure used for the fumigant monitoring involved canister sampling. Both methyl bromide and 1,3-dichloropropene were analyzed from each canister sample. Canister samples were collected for the fumigants from September 11, 2000 through November 3, 2000. For canisters, 24-hour samples were taken Monday through Friday (4 sample periods/week). The canister monitoring study included 186 individual sampling periods (6 sites x 31 sampling days). Results for six of the sampling periods were "invalidated" due to a sampling flow rate problem described below. One sample (LJE-08) was not analyzed due to a laboratory error.

Charcoal adsorbent tube samples were collected, for 1,3-dichloropropene only, for one week (from September 11 to September 15, 2000) for the purpose of comparing the

results of the canister and charcoal tube methods. The 1,3-dichloropropene monitoring period included 24 individual sampling days (6 sites x 4 sampling days) but one sampling day (SAL-T2) was not collected due to technician error. Charcoal adsorbent tube samples were also collected, for methyl bromide only, for one week (from September 25 to September 29, 2000) for the purpose of comparing the results of the canister and charcoal tube methods. The methyl bromide monitoring period included 24 individual sampling days (6 sites x 4 sampling days) but samples for eight periods were not submitted for analysis due to sampling problems and results for six additional periods were lost due to laboratory error.

Collocated (duplicate) samples were collected for 1 day/week (normally each Wednesday) at each sampling location. Trip blanks were submitted once per week (per method used, can or cartridge).

A. Canisters: Methyl Bromide and 1,3-Dichloropropene

Integrated ambient air samples were collected using passive air sampling into evacuated 6 liter Silcosteel® treated canisters (from Restek Corporation). The flow rate of 3.0 standard cubic centimeters per minute (sccpm) was set and measured using a calibrated mass flow meter (battery operated). The mass flow meter (MFM) was calibrated to standard conditions (1 atm and 25 °C). On-site meteorological data was not collected. Therefore, the field flow rate readings were not corrected to actual conditions (ambient average temperature and pressure). The sampling system operated continuously for approximately 24 hours with the exact operating interval recorded in the log-book (see Appendices, pg. 182). At the end of each sampling period, the canisters were placed in shipping containers, with a sample identification/chain of custody sheet, and shipped, by UPS, as soon as reasonably possible to the ARB Sacramento laboratory for analysis. The samples were stored at ambient laboratory temperature prior to analysis. The canister samples were at sub-atmospheric pressure when delivered to the laboratory where they were pressurized (by addition of clean nitrogen gas) to approximately 5 pounds per square inch gauge (psig) before analysis.

Silcosteel® passive air sampling kits were obtained from Restek Corporation. Referring to Figure 2, the critical orifice flow controllers (Silcosteel® treated Veriflo SC423XL, from Restek Corporation) are attached, using a Silcosteel® treated swagelock connector, to the valve fitting on the canister. A 6 foot section of 1/8 inch O.D, Silcosteel® treated copper tubing is attached to the inlet end of an in-line, 5 micron filter, which is attached to the inlet end of the flow controller. The inlet end of the tubing is bent into a U shape (to prevent rain from entering) and supported about 5 1/2 feet above the building roof tops for the ambient monitoring.

When using a critical orifice flow restrictor for passive integrated canister sampling, the potential decrease in flow rate as the vacuum in the canister changes must be taken into account. The flow control device used for the study (Veriflo SC423XL, from Restek

Corporation) was designed to regulate and maintain a constant flow as the vacuum in the canister decreases. The manufacturer specifications indicate that the controller is capable of maintaining a continuous low flow with vacuum ranges from -29.9 to -5 inHg. The in-line filter helps prevent particles from entering the critical orifice of the flow controller, which could clog the critical orifice and affect the flow through the controller. The manufacturer specifications indicate that the outside temperature can have a slight effect on the flow rate. For example, there could be an approximately 6% flow drop when the temperature changes from 80 °F to 125 °F.

Canister vacuum readings were measured by the laboratory staff before and after transport of each canister to/from the field. The laboratory vacuum readings were used to calculate the sample volumes collected. The canister vacuum readings were also recorded in the field at the start and end of each sampling period using the -30 to 0 inHg gauge on the passive samplers. The start and end canister vacuum readings should have been approximately -29.9 inHg and -8 inHg respectively if all sampling parameters functioned correctly at a flow rate of 3.0 sccpm. However, referring to the field log sheets (pg. 182 of appendices), the sampling period end vacuum readings were different than expected for some samples. Also, the start flow rate was set to 3.0 sccpm for all samples but the sampling period end flow rate for a number of samples deviated from 3.0 sccpm. Fourteen samples (8 were one of the samples in a collocated pair) have been flagged due to unacceptable deviation in the flow rate. Sample results were flagged if the end flow rate deviated from 3.0 sccpm by greater than 25% (i.e., less than 2.2 sccpm or greater than 3.8 sccpm). This criteria, based on a review by the ARB Quality Management Branch, was applied to ensure the representativeness of the integrated samples.

The canister sampling field log sheets are enclosed as Appendix VI (pg. 182 of appendices). These forms were used to record start and stop times, start and stop flow rates and vacuum readings, sample identifications, weather conditions, sampler's initials and any other significant data.

B. Charcoal Tubes

The sampling method consisted of passing measured quantities of ambient air through charcoal tubes. For 1,3-dichloropropene, the sampling tubes are 8 mm x 110 mm, coconut-base charcoal with 400 mg in the primary section, and 200 mg in the secondary (SKC catalogue #226-09). Sample collection for 1,3-dichloropropene was for 24 hours at a flow rate of 3.0 standard liters per minute (sLpm). For methyl bromide, the sampling tubes are 8 mm x 110 mm, petroleum-base charcoal with 400 mg in the primary section, and 200 mg in the secondary (SKC catalogue #226-38-02). Sample collection for methyl bromide was for 24 hours at a flow rate of 5.0 standard cubic centimeters per minute (sccpm). Subsequent to sampling, the tubes were capped, labeled, placed in a culture tube and stored and transported in an insulated container with dry ice. The samples were transported to the ARB laboratory in Sacramento.

Referring to Figure 3, each sample train consists of a charcoal tube, Teflon fittings and tubing, rain/sun shield, rotameter, train support and a 115 volt AC vacuum pump. Each tube is prepared for use by breaking off each sealed glass end and then immediately inserting the tube into the Teflon fitting. The tubes are oriented in the sample train according to a small arrow printed on the side of each tube indicating the direction of flow. A 0-5 Lpm rotameter was used to control sample flow for the 1,3-dichloropropene sampling. A 0-50 ccpm rotameter was used to control sample flow for the methyl bromide sampling. The methyl bromide sampling tree also included a flow bypass to allow a greater volume of flow (e.g., 5Lpm) through the pump to avoid damage to the pump. The flow rates were set using calibrated digital mass flow meters (MFM) before the start of each sampling period. A MFM scaled from 0-5 sLpm was used for the 1,3-dichloropropene samplers. A MFM scaled from 0-10 sccpm was used for the methyl bromide samplers. The flow rate was also checked and recorded, using the MFMs, at the end of each sampling period. Any change in flow rates was recorded in the field logbooks (pgS. 198 and 201 of the appendices). Samplers were leak checked prior to each sampling period with the sampling tubes installed.

For the methyl bromide tube sampling, the starting flow rate was set to 5.0 sccpm for all samples but the sampling period end flow rate changed for a number of samples. This was due to the difficulty of setting the very low flow rate of 5.0 sccpm. As per an agreement with DPR staff, ten samples (2 were collocated samples) were not submitted to the laboratory for analysis due to unacceptable deviation in the flow rate. Samples were not submitted if the end flow rate deviated from 5.0 sccpm by greater than 20% (i.e., less than 4.0 sccpm or greater than 6.0 sccpm).

C. Sampling Site Selection

The historical use patterns for methyl bromide and 1,3-dichloropropene suggested that monitoring should occur in Monterey/Santa Cruz Counties during the months of September and October to coincide with the use of the two soil fumigants prior to planting of a variety of crops. Monitoring was conducted in Monterey/Santa Cruz Counties from September 11, 2000 through November 3, 2000. ARB staff selected a total of six sampling sites, five in Monterey County and one in Santa Cruz County. The sampling site selection specifically focused on areas of historical use of methyl bromide prior to planting strawberries. In two cases, sites (OAS and CHU) were selected for monitoring based on their proximity to historical use of 1,3-dichloropropene. Sampling sites were selected "in populated areas or in areas frequented by people." Site selection was also based upon considerations for accessibility, security of the sampling equipment, and compliance with technical siting requirements. "Urban background" samples were collected at the Monterey Bay Unified APCD ambient air monitoring station in Salinas. The six sites are shown in Figure 1 and listed in Table 1. Again, the sampling sites are near areas of historical use of methyl bromide and 1,3-dichloropropene. However, the ARB understands that DPR staff will verify and quantify the actual use of methyl bromide and 1,3-dichloropropene that occurred during the study when the information becomes available.

Table 1
Ambient Sampling Sites

SAL	MBUAPCD Ambient Monitoring Station 867 E. Laurel Drive Salinas, CA 95905 Section/Township/Range: S.27/T.14S/R.3E GPS Coordinates: N. 36° 41.63' W. 121°37.39'	(831) 647-9411 Tony Sotello, Station Operator
OAS	Oak Avenue School 1239 Oak Avenue Greenfield, CA 93927 Section/Township/Range: S.6/T.18S/R.6E GPS Coordinates: N. 36° 18.92' W. 121° 15.10'	(831) 647-2840 Edward Agundez, Superintendent
CHU	Chualar School 24285 Lincoln Street Chualar, CA 93925-0188 Section/Township/Range: S.3/T.16S/R.3E GPS Coordinates: N. 36° 34.37' W. 121° 31.00'	(831) 679-2504 Nancy Torres, Business Manager
LJE	La Joya Elementary 55 Rogge Road Salinas, CA 93906 Section/Township/Range: S.10/T.13S/R.3E GPS Coordinates: N. 36° 43.97' W. 121° 38.05'	(831) 443-7200 Dr. Bob McLaughlin, Superintendent
PMS	Pajaro Middle School 250 Salinas Road Watsonville, CA 95076 Section/Township/Range: S.9/T.12S/R.1E GPS Coordinates: N. 36° 53.91' W. 121° 43.95'	(831) 728-6238 Jackie Defendis, Principal
SES	Salsepuedes Elementary School 115 Casserly Road Watsonville, CA 95076 Section/Township/Range: S.22/T.11S/R.2E GPS Coordinates: N. 36° 57.67' W. 121° 43.88'	(831) 728-6830 Rebecca Salinas, Principal

The urban background site was located at Monterey Bay Unified APCD's ambient air monitoring station in the city of Salinas (SAL). The station monitors concentrations and/or collects samples of most criteria gas and particulate pollutants as well as meteorological data. The site was located in an area having a mix of suburban, light commercial, and agriculture. Salinas has an approximate population of over 125,000. The pesticide samplers were operated on a sampling platform, 3 feet above ground level. Sampler intakes were 5 feet

above platform level for a total height of 8 feet above ground level. No obstructions were present and the site met all technical siting requirements. Elevation of the site is 230 feet above mean sea level (MSL). There was a large strawberry field located ¼ mile to the west. If there was an application of methyl bromide to this strawberry field during the monitoring study then this sampling site may not represent an "urban background" location.

The Oak Avenue School site was located in a residential and agricultural area in the southern portion of the town of Greenfield which has a population of less than 10,000. The pesticide samplers were operated on the roof of one of the school buildings, 18 feet above ground level. Sampler intakes were 5 feet above roof level for a total height of 23 feet above ground level. No obstructions were present and the site met all technical siting requirements. Elevation of the site is 225 feet above MSL. There were agricultural fields adjacent to the school on the east, north and west at a distance of several hundred yards.

The Chualar School site was located in a residential and agricultural area in the northeast corner of Chualar which has a population of less than 500. The pesticide samplers were operated on the roof of one of the school buildings, 15 feet above ground level. Sampler intakes were 5 feet above roof level for a total height of 20 feet above ground level. No obstructions were present and the site met all technical siting requirements. Elevation of the site is 175 feet above MSL. There were agricultural fields on the east and north sides of the school at a distance of several hundred yards.

The La Joya Elementary School site was located in a residential and agricultural area on the northeastern outskirts of Salinas. The pesticide samplers were operated on the roof of a hallway corridor, 9 feet above ground level. Sampler intakes were 5 feet above roof level for a total height of 14 feet above ground level. No obstructions were present and the site met all technical siting requirements. Elevation of the site is 165 feet above MSL. Strawberry fields were seen ¼ mile to the northeast, ½ mile to the north, and ½ mile to the southeast.

The Pajaro Middle School site was located in an area on the southern outskirts of the City of Watsonville and just south of the county line. This area had a mix of residential, commercial, and agriculture. The pesticide samplers were operated on the roof of a school building 16 feet above ground level. Sampler intakes were 5 feet above roof level for a total height of 21 feet above ground level. The site met all technical siting requirements except for a wall 21 feet to the east extending 15 feet above the sampler inlet. Elevation of the site is 150 feet above MSL. Large strawberry fields were located less than ¼ mile to the west and southwest.

The Salsepuedes Elementary School site was located in a rural area just north of the city of Watsonville. This area had a mix of residential and agriculture. The pesticide samplers were operated on the roof of a school building 12 feet above ground level. Sampler intakes were 5 feet above roof level for a total height of 17 feet above ground level. The site met all technical siting requirements. Elevation of the site is 160 feet above MSL. Large strawberry fields were located approximately one mile to the north and east.

IV. Analytical Methodology

The standard operating procedures for sampling and analysis of methyl bromide and 1,3-dichloropropene in Silcosteel™ canisters are enclosed in Appendix II (pages 108 and 114 of appendices). The procedures specify that ambient air is collected into evacuated 6-liter Silcosteel™ canisters and field sampling is conducted with passive integrated samplers. A gas chromatograph/quadrupole mass spectrometer (GC/MS) with a cryogenic preconcentrator is used for analysis. The MS detector is operated in selected ion monitoring (SIM) mode using deuterated bromomethane and deuterated 1,2-dichloropropane as internal standards. The field samples are delivered to the lab at sub-ambient pressure and are pressurized to approximately 5 psig before analysis. The target estimated quantitation limits (EQLs) requested by DPR for methyl bromide and dichloropropene were 0.4 micrograms/m³ and 0.01 micrograms/m³ respectively. To maintain consistency with the laboratory reports, units of nanograms (ng), rather than micrograms (μg), will be used for the remainder of this report. Thus, the DPR target EQLs were 400 ng/m³ and 10 ng/m³ respectively for methyl bromide and dichloropropene. The EQLs achieved by the laboratory staff, based on a 400 ml analytical sample size, were 36 ng/m³ for methyl bromide, 42 ng/m³ for cis 1,3-dichloropropene and 60 ng/m³ for trans 1,3-dichloropropene. The maximum sample size was set at 400 ml based on the increased probability of matrix interferences from high levels of sample moisture with larger sample volumes. The GC/MS instrument was run using selected ion monitoring mode to achieve the highest level of instrument sensitivity. Given the sample size and instrument parameters the EQLs reported are the best that could be achieved.

The charcoal tube method, "Standard Operating Procedure, Sampling and Analysis of cis/trans 1,3-Dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector" is enclosed in Appendix III (page 146 of appendices). The procedures specify that the charcoal (coconut base) tube samples are stored in an ice chest or refrigerator until extracted with 3 ml of dichloromethane. A gas chromatograph with a mass selective detector in the selected ion monitoring mode was used for analysis. The ARB charcoal tube method (2000 version) for 1,3-dichloropropene has EQLs of 24.0 and 27.3 ng/sample for cis and trans 1,3-dichloropropene, respectively. For a 24-hour sampling period at 3 sLpm the EQLs in terms of air concentrations are 5.6 ng/m³ (1.2 pptv) and 6.3 ng/m³ (1.4 pptv) for cis and trans 1,3-dichloropropene, respectively. Note that the analytical method for the 2000 1,3-dichloropropene charcoal tube sampling has been modified (extraction solvent and detector) relative to the past ARB monitoring studies for 1,3-dichloropropene.

The CDFA charcoal tube method, "Standard Operating Procedures for the Analysis of Methyl Bromide in Ambient Air Charcoal Tube Samples", is enclosed in Appendix I (page 62 of the separate volume of appendices to this report). Methyl bromide in the air that has been absorbed onto activated charcoal is desorbed from the charcoal with

ethyl acetate. Subsequently, methyl bromide is quantified using a gas chromatograph equipped with a HP-5 megabore capillary column and an electron capture detector. The "minimum detectable level" was 200 ng/sample which corresponds to an air concentration of 28,000 ng/m³ for a 24 hour sample at a flow rate of 5.0 sccpm.

V. Monitoring Results

A. Canister Monitoring Results

Table 2 presents the results of ambient air monitoring for methyl bromide and 1,3-dichloropropene using canisters. Summaries of the ambient canister results for 1,3-dichloropropene and methyl bromide are presented in Tables 3 and 4 respectively. Samples were collected on 186 individual sampling periods (6 sites x 31 sampling days each). Results for six of the sampling periods were "invalidated" due to a sampling flow rate problem. One sample (LJE-08) was not analyzed due to a laboratory error.

As stated previously, a number of samples have been "flagged" due to unacceptable deviation in the sampling flow rate. Sample results were flagged if the end flow rate deviated from 3.0 sccpm by > 25% (i.e., <2.2 sccpm or >3.8 sccpm). This criteria, based on a review by the ARB Quality Management Branch, was applied to ensure the representativeness of the integrated samples. In order to collect a "representative" integrated sample the flow rate should remain constant over the duration of the sampling period, producing an accurate ("representative") average result for a 24-hour sampling period. This is important because there is no information about the variation of pesticide air concentration during the sampling period. Also, there is no way to know when the flow alteration occurred during the sampling period. Samples with a flow deviation >25% may not produce an accurate average that is representative of the 24-hour sampled period. The results of samples, where the end flow rate deviated from 3.0 sccpm by > 25%, are included and flagged in Table 2. However, these sample results have not been included in the results summary Tables 3 and 4. Thus the results of the flagged samples have not been included in the calculation of average concentrations as listed in Table 3 and 4. Fourteen samples were flagged (**) in Table 2 for this problem. Eight of these flagged samples were one of the samples in a collocated pair for which the other sample was valid. Thus, the results of six sampled periods were affected by this sampling problem.

The Special Analysis Section laboratory determined the method detection limit (MDL) as $3.14 \times s$ (from 40 CFR 136, Appendix B); where s is the standard deviation calculated for the results of seven replicate canister spikes (near the estimated detection limit). The MDL was 7.1 ng/m³ for methyl bromide. The MDLs were 8.5 ng/m³ and 12 ng/m³ for cis and trans 1,3-dichloropropene, respectively. The estimated quantitation limit (EQL), calculated as 5 times the MDL, for methyl bromide was 36 ng/m³ and the EQLs for cis and trans 1,3-dichloropropene were 42 and 60 ng/m³ respectively. Results equal to or above the MDL but below the EQL are reported as

detected (Det). Laboratory results, in units of ng/m^3 , equal to or above the EQL were reported to 3 significant figures. The 1,3-dichloropropene results are reported separately for the cis and trans isomers and are also reported as total (cis + trans) 1,3-dichloropropene. Only values greater than the EQLs for the cis and trans isomers were used to calculate the total 1,3-dichloropropene. The equation used to convert methyl bromide air concentration results from units of ng/m^3 to parts per trillion by volume (pptv) units at 1 atmosphere and 25 °C is shown below.

$$\text{pptv} = (\text{ng/m}^3) \times \frac{(0.0820575 \text{ liter-atm/mole-}^\circ\text{K})(298^\circ\text{K})}{(1 \text{ atm})(94.9 \text{ gram/mole})} = (0.2577) \times (\text{ng/m}^3)$$

The equation used to convert 1,3-dichloropropene (total) air concentration results from units of ng/m^3 to pptv units at 1 atmosphere and 25 °C is shown below.

$$\text{pptv} = (\text{ng/m}^3) \times \frac{(0.0820575 \text{ liter-atm/mole-}^\circ\text{K})(298^\circ\text{K})}{(1 \text{ atm})(111.0 \text{ gram/mole})} = (0.2203) \times (\text{ng/m}^3)$$

For methyl bromide, of the one-hundred-eighty-six (186) ambient canister samples collected (spikes, blanks and the lower value of collocated sample sets excluded), one-hundred-seventy-nine (179)(96%) were found to be above the EQL, none (0%) were found to have results of "detected", none (0%) were below the MDL, six (6)(3%) were "flagged" due to sampling problems and one (1)(.5%) was not analyzed due to laboratory error. The highest methyl bromide concentration, 119,000 ng/m^3 (31,000 pptv), was observed at the Pajaro Middle School (PMS) sampling site on October 23, 2000. The highest eight week average, 28,900 ng/m^3 (7,450 pptv) was also at the Pajaro Middle School.

For 1,3-dichloropropene, of the one-hundred- eighty-six (186) ambient canister samples collected (spikes, blanks and the lower value of collocated sample sets excluded), forty-one (41)(22%) were found to be above the EQL, twenty-five (25)(13%) were found to have results of "detected", one-hundred-thirteen (113)(61%) were below the MDL, six (6)(3%) were "flagged" due to sampling problems and one (1)(.5%) was not analyzed due to laboratory error. The highest 1,3-dichloropropene (total) concentration, 4,340 ng/m^3 (956 pptv), was observed at the Chualar School (CHU) sampling site on September 12, 2000. The highest eight week average, 409 ng/m^3 (90 pptv) was also at the Chualar School.

For 1,3-dichloropropene, the MDLs for some samples were higher than outlined above. The following samples were not run at the full analytical sample volume (400 cc). A smaller volume was introduced into the instrument in order to keep very high methyl bromide concentrations within the analytical calibration range. For future studies, such samples will be rerun at the full analytical sample volume to maintain consistency of the MDL. Referring to Table 3, the higher MDLs were used for those samples for the calculation of average concentrations.

<u>Sample I.D.</u>	<u>cis-MDL</u>	<u>trans-MDL</u>
SAL-02	30.2 ng/m ³	43.5 ng/m ³
LJE-03	30.2 ng/m ³	43.5 ng/m ³
SAL-03	22.8 ng/m ³	32.8 ng/m ³
SAL-3D	22.8 ng/m ³	32.8 ng/m ³
SES-01	22.8 ng/m ³	32.8 ng/m ³
SES-02	45.6 ng/m ³	65.6 ng/m ³

B. 1,3-Dichloropropene Charcoal Tube Monitoring Results

Table 9 presents the results of ambient air monitoring for 1,3-dichloropropene using charcoal tubes. A summary of the charcoal tube results is presented in Table 10. Table 15 compares the canister and charcoal tube results for 1,3-dichloropropene for the four sampling days when both types of samples were collected. Note that the Sample I.D.s for the charcoal tube samples do not correlate with those of the canister samples. The "Start Sampling Date" must be used to correlate and compare canister and charcoal tube results for samples collected on the same days.

Laboratory results, in units of ng/sample, equal to or above the estimated quantitation limits (EQL) of 24.0 ng/sample and 27.3 ng/sample for cis and trans 1,3-dichloropropene, respectively, are reported to 3 significant figures. Results equal to or above the MDLs of 4.80 ng/sample and 5.46 ng/sample for cis and trans 1,3-dichloropropene, respectively, but below the EQLs are reported as detected (Det). Air concentration results (in units of ng/m³ and pptv) are reported to 2 significant figures. The air concentration, expressed in units of ng/m³ (or pptv), associated with the EQL is dependent on the volume of air sampled which varies from sample to sample. For a 24-hour sampling period at 3 sLpm the air concentration would be 5.6 ng/m³ (1.2 pptv) and 6.3 ng/m³ (1.4 pptv) for cis and trans 1,3-dichloropropene, respectively, as associated with the EQLs.

For 1,3-dichloropropene, of the twenty-three ambient charcoal tube samples collected (spikes, blanks and the lower of collocated samples excluded), twenty-two were found to be above the EQL, one was below the MDL and one sample (PMS-4) was not reported due to a sampling problem. The highest 1,3-dichloropropene (total) concentration, 3600 ng/m³, was observed at the Chualar School (CHU) sampling site on September 12, 2000.

C. Methyl Bromide Charcoal Tube Monitoring Results

Table 16 presents the CDFA laboratory results of ambient air monitoring for methyl bromide using charcoal tubes. A summary of the charcoal tube results is presented in Table 17. Table 18 compares the canister and charcoal tube results for methyl bromide for the four sampling days when both types of samples were collected. Note that the Sample I.D.s for the charcoal tube samples do not correlate with those of the canister samples. The "Start Sampling Date" must be used to correlate and compare canister

and charcoal tube results for samples collected on the same days.

The CDFA laboratory "minimum detection level" was 200 ng/sample. The air concentration, expressed in units of ng/m³ (or pptv), associated with the reporting limit is dependent on the volume of air sampled which varies from sample to sample. For a 24-hour sampling period at 5 sccpm the air concentration would be 28,000 ng/m³ as associated with the reporting limit.

The methyl bromide monitoring period included 24 individual sampling days (6 sites x 4 sampling days) but samples for eight periods were not submitted for analysis due to sampling problems and results for six additional periods were uncertain due to laboratory error. None of the remaining 10 sampling periods had results above the reporting limit. Referring to Table 18, the canister results for these 10 sampling periods were all below the charcoal tube reporting limit of 28,000 ng/m³.

VI. Quality Assurance

Field QC for the canister monitoring included the following :

- 1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling) prepared by the Special Analysis Section staff; the field spikes were obtained by sampling ambient air at the background monitoring site for 24 hour periods (collocated with an ambient sample);
- 2) four trip spikes;
- 3) collocated (duplicate) samples taken once per week at each sampling location; and
- 4) 4 trip blanks;
- 5) The battery operated mass flow meters used to set and check the sampling flow rate (for canisters and charcoal tubes) were calibrated by the ARB Program Evaluation and Standards Section.

Trip and field spikes, blanks, and collocated samples were also collected for the charcoal tube monitoring. Rotameters were used to control the sampling flow rate for the charcoal tube sampling. For both canisters and charcoal tubes, the flow rates were set at the start of every sampling period (every sample) using a calibrated digital mass flow meter (battery operated). The flow rates were also checked and recorded at the end of each sampling period using the mass flow meter.

VII. Quality Assurance Results

A. Method Development

Refer to Appendices II and III (pages 78 and 129 of the appendices) for discussion and results of method development studies. The canister storage stability study results (pg. 83 of appendices) show that methyl bromide and 1,3-dichloropropene are stable for at least 31 days (under laboratory conditions). All of the canister samples were analyzed within 12 days of receipt. The charcoal tube freezer storage stability study results (pg. 151 of appendices) show that 1,3-dichloropropene recovery is 76% after 11 days. All of the 1,3-dichloropropene charcoal samples were analyzed within 7 days of receipt. The methyl bromide charcoal tubes were all analyzed by the CDFA laboratory within 4 days of receipt.

B. Trip Blanks

Referring to page 101 of the appendices, all four of the canister trip blanks were <MDL for 1,3-dichloropropene and methyl bromide. No charcoal tube trip blank was submitted for 1,3-dichloropropene. The charcoal tube trip blank for methyl bromide was below the MDL.

C. Collocated Sample Results

Referring to Table 5, forty collocated pairs of canister samples had both methyl bromide results above the EQL. The relative differences ($100 \times \text{difference/average}$) of the methyl bromide (canister) data pairs averaged 7.9% and ranged from 0.5% to 45%.

Referring to Table 5, eight collocated pairs of canister samples had both 1,3-dichloropropene (total) results above the EQL. The relative differences ($100 \times \text{difference/average}$) of the 1,3-dichloropropene (canister) data pairs averaged 12% and ranged from 0.2% to 37%.

Referring to Table 11, six of the charcoal tube collocated pairs had both results for 1,3-dichloropropene above the EQL. The relative differences ($100 \times \text{difference/average}$) averaged 6.1% and ranged from 0% to 18%.

D. Laboratory, Trip and Field Spikes

Canister laboratory, trip and field spikes were prepared and collected 4 times during the study (approximately every other week). To prepare the spike samples, laboratory staff adds a small volume (100 ml) of a gas standard, with a certified concentration of methyl bromide and 1,3-dichloropropene, to an evacuated canister. The laboratory canister spikes are kept in the laboratory at room temperature until analysis. The trip spike samples are kept in the vehicle (the same one used for samples) during transport to and from the field and at all times while in the field. The field spikes were collected by sampling ambient air into the previously spiked cans and were collocated with an ambient sample (same location, flow rate and sampling time). The collocated (unspiked) sample result is subtracted from the field spike sample result before calculation of percent recovery of the analytes. The laboratory, trip and field spikes are

pressurized before analysis to approximately 5 psig. The analysis of laboratory, trip and field spikes normally occurs at the same time. Laboratory, trip and field canister spikes were prepared by Special Analysis Section staff from the stock standard used for analysis method calibration.

To prepare the spike samples, laboratory staff injects a small volume (20 ul) of a solvent standard with a known amount of methyl bromide or 1,3-dichloropropene to the charcoal cartridges. The charcoal tube laboratory spikes are placed immediately in a freezer and kept there until extraction and analysis. The trip spikes are kept in a freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. The field spikes were collected by sampling ambient air through the previously spiked cartridges and were collocated with an ambient sample (same location, flow rate and sampling time). The collocated (unspiked) sample result is subtracted from the field spike sample result before calculation of percent recovery of the analytes. The field spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for the sampling period. The extraction and analysis of laboratory, trip and field spikes normally occurs at the same time. Charcoal tube laboratory, trip and field spikes were prepared by Special Analysis Section staff and CDFA staff for 1,3-dichloropropene and methyl bromide respectively.

- 1) Canister Laboratory Spikes: The canister laboratory spike results are listed in Table 6. The average recoveries for methyl bromide and cis and trans 1,3-dichloropropene for the canister lab spikes were 101%, 91% and 90% respectively.

1,3-Dichloropropene Charcoal Tube Laboratory Spikes: The charcoal tube laboratory spike results are listed in Table 12. Each of the spike cartridges was spiked with 28.8 ng and 29.4 ng of cis and trans 1,3-dichloropropene, respectively. The average recoveries for cis and trans 1,3-dichloropropene for the charcoal tube lab spikes were 91% and 89% respectively.

- 2) Canister Trip Spikes: The canister trip spike results are listed in Table 7. The average recoveries for methyl bromide and cis and trans 1,3-dichloropropene for the canister trip spikes were 101%, 88% and 87% respectively. These results are consistent with the lab spike results and indicate that the sample transport, storage and analytical procedures used in this study produce acceptable results for methyl bromide and 1,3-dichloropropene.

1,3-Dichloropropene Charcoal Tube Trip Spikes: The charcoal tube trip spike results are listed in Table 13. Each of the spike cartridges was spiked with 28.8 ng and 29.4 ng of cis and trans 1,3-dichloropropene, respectively. The average recoveries for cis and trans 1,3-dichloropropene for the charcoal tube lab spikes were 91% and 90% respectively.

Methyl Bromide Charcoal Tube Trip Spikes: The charcoal tube trip spike results are listed in Table 19. Each of the spike cartridges was spiked with 1.6 ug of methyl bromide. The average recovery for the charcoal tube lab spikes was 57%.

- 3) Canister Field Spikes: The canister field spike results are listed in Table 8. The average recoveries for methyl bromide and cis and trans 1,3-dichloropropene for the canister lab spikes were 24%, 104% and 107% respectively. The results for 1,3-dichloropropene are consistent with the lab and trip spike results and indicate that the sampling, sample transport, storage and analytical procedures used in this study produce acceptable results for 1,3-dichloropropene. The concentration of methyl bromide in the collocated samples run on 9/11/00 and 10/19/00 were over 10 times greater than the spike amount. Method variability of the higher level ambient results could account for the discrepancy in the lower level spike recovery calculation. For "field" spike recovery determination the spike level should be at least 5 to 10 times higher than the ambient concentration. For future studies the spike levels will be increased to avoid this problem.

1,3-Dichloropropene Charcoal Tube Field Spikes: The charcoal tube field spike results are listed in Table 14. Each of the spike cartridges was spiked with 28.8 ng and 29.4 ng of cis and trans 1,3-dichloropropene, respectively. The average recoveries for cis and trans 1,3-dichloropropene for the charcoal tube field spikes were 207% and 160% respectively. The results for both cis and trans 1,3-dichloropropene are high. The concentration of 1,3-dichloropropene in the collocated sample was significantly greater than the spike amount. Method variability of the higher level results could account for the discrepancy in the lower level spike recovery calculation. For future studies the spike levels will be increased to avoid this problem.

Methyl Bromide Charcoal Tube Field Spikes: The charcoal tube field spike results are listed in Table 20. Each of the spike cartridges was spiked with 1.6 ug of methyl bromide. Two of the field spike samples were not submitted to the laboratory for analysis due to sampling problems. The average recovery of the remaining two field spikes was 58%.

E. Canister/Charcoal Tube Results Comparison

The 1,3-dichloropropene results of canister and charcoal tube samples for the four sampling days when both types of samples were collected are presented in Table 15. In general, the tube results agree very well with the canister results. One canister sample result (LJE-3, 09/13/00) was significantly greater than the collocated charcoal tube result. The ratio of the canister to charcoal tube result was 33.8 for that day. This ratio is significantly higher than any of the other result ratios compared. The laboratory staff double-checked the analysis documentation but found no explanation for the higher canister result. If the LJE (09/13/00) sample ratio is not included then the average ratio of canister results to the charcoal tube results is 1.0 (the average of the

"Ave Ratios" in Table 15). However, further statistical evaluation of the data (e.g., a regression analysis) should be performed for determination of multiplicative coefficient.

The methyl bromide results of canister and charcoal tube samples for the four sampling days when both types of samples were collected are presented in Table 18. Charcoal tube samples for eight periods were not submitted for analysis due to sampling problems and results for six additional periods were uncertain due to laboratory error. None of the remaining 10 sampling periods had results above the reporting limit. The canister results for these 10 sampling periods were all below the charcoal tube reporting limit of 28,000 ng/m³ and so no comparison can be made. However, the CDFA laboratory report contained the following "remarks:"

"In the past all sample tubes were labeled individually. This time one of our student assistants did not realize the charcoal tubes were not labeled. She took out all the samples assigned to her from labeled packages. So, the identities of this sample set were lost. The sample log #s in this set are 16, 17, 26, 32, 7, 27, 33. However, I analyzed all of them and found 0.2 ug methyl bromide in one A-tube, trace amount in two A-tubes, none detected in 4 A-tubes and none detected in all 7 B-tubes." ("A" and "B" tubes referred to the front and back sections of charcoal sampling cartridges, respectively.)

Results for these seven samples are deemed "uncertain." Referring to Appendix VIII and Table 18, the canister results for five of these sampling periods were below the charcoal tube reporting limit of 28,000 ng/m³ (200 ng/sample). However, two of the canister samples had methyl bromide levels significantly above 28,000 ng/m³. Samples PMS-11 and PMS-12 had methyl bromide results of 51,600 ng/m³ and 83,300 ng/m³ respectively. The highest level found in the 7 "uncertain" samples was 28,000 ng/m³. This indicates a significant difference between results of colocated canister and charcoal tube samples for methyl bromide. Additional comparative sampling for methyl bromide using canisters and charcoal tubes is planned for the fumigant monitoring scheduled for later in 2001.

Figure 1. Ambient Monitoring Area
(use map provided by DPR)

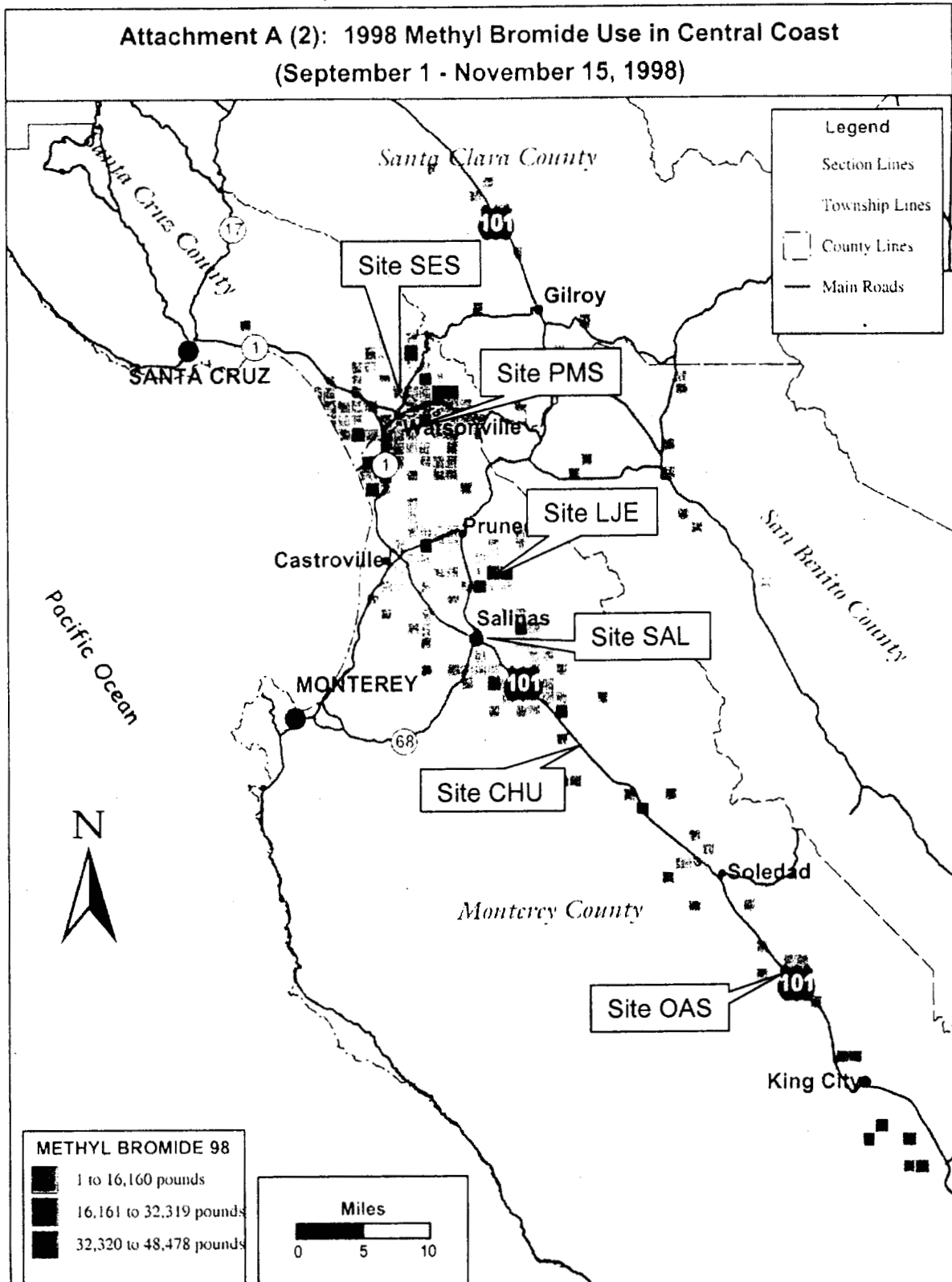


Figure 2
Passive Canister Sampling Train

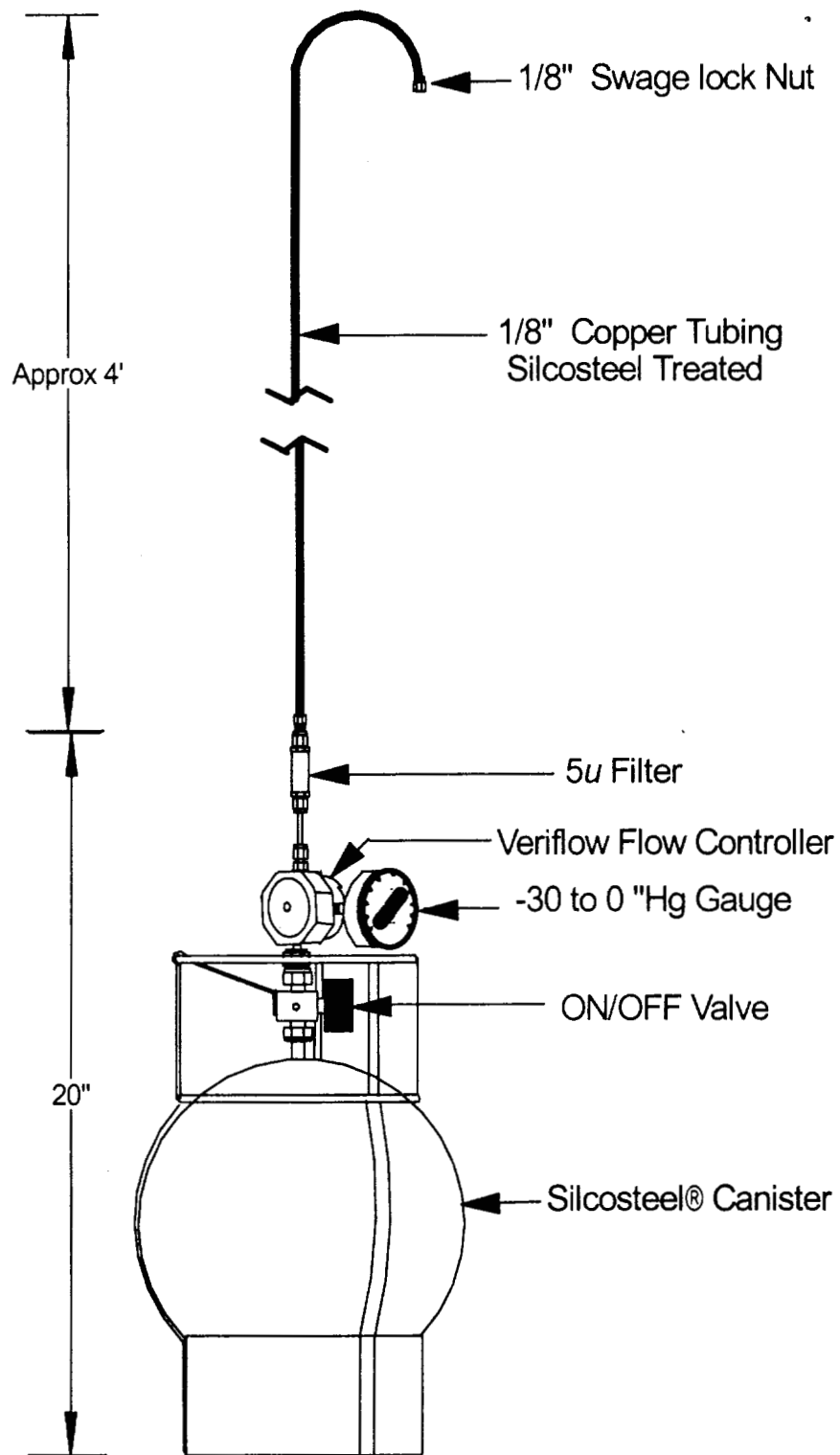


FIGURE 3.
Sample Tree

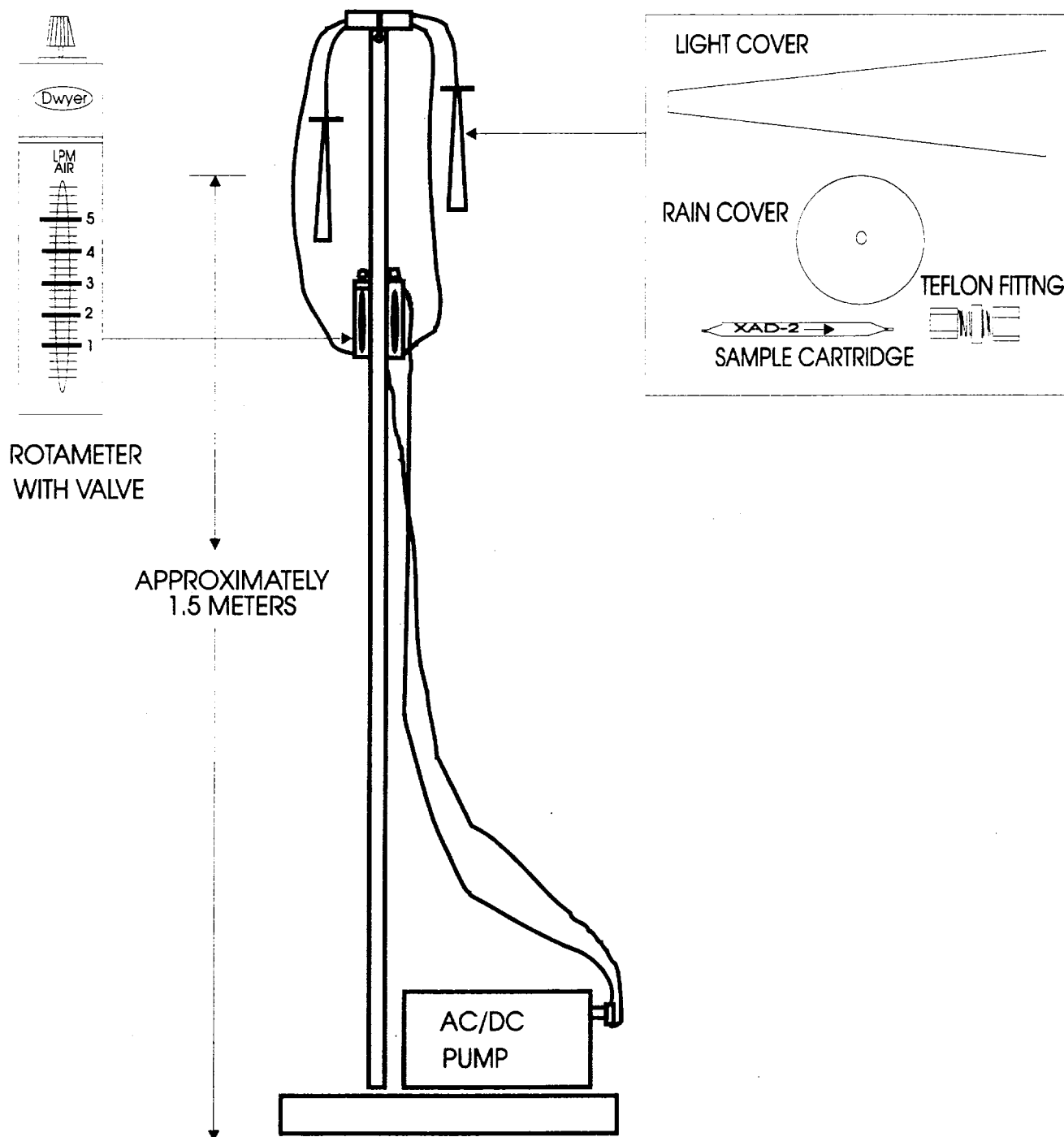


Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
2	SAL-01	09/11/00	7.67E+03	2.0E+03	9.10E+01	Det	9.10E+01	2.01E+01	
3	OAS-01	09/11/00	1.22E+03	3.1E+02	1.60E+02	1.20E+02	2.80E+02	6.17E+01	
4	CHU-01	09/11/00	2.58E+03	6.6E+02	1.43E+03	8.42E+02	2.28E+03	5.01E+02	
5	LJE-01	09/11/00	2.16E+04	5.6E+03	<MDL	<MDL	<MDL	<MDL	
6	PMS-01	09/11/00	1.97E+04	5.1E+03	2.14E+02	9.67E+01	3.11E+02	6.85E+01	
7	SES-01	09/11/00	3.67E+04	9.5E+03	<MDL	<MDL	<MDL	<MDL	1
8	SAL-02	09/12/00	8.28E+03	2.1E+03	<MDL	<MDL	<MDL	<MDL	1
9	OAS-02	09/12/00	2.62E+03	6.7E+02	3.50E+02	2.42E+02	5.93E+02	1.31E+02	
10	OAS-02D	09/12/00	2.71E+03	7.0E+02	3.83E+02	2.59E+02	6.41E+02	1.41E+02	
11	CHU-02	09/12/00	3.13E+03	8.1E+02	2.70E+03	1.64E+03	4.34E+03	9.56E+02	
12	LJE-02	09/12/00	9.33E+04	2.4E+04	<MDL	<MDL	<MDL	<MDL	
13	PMS-02	09/12/00	3.92E+04	1.0E+04	1.45E+02	1.14E+02	2.59E+02	5.70E+01	
14	SES-02	09/12/00	6.37E+04	1.6E+04	<MDL	<MDL	<MDL	<MDL	1
17	SAL-03	09/13/00	5.82E+03	1.5E+03	<MDL	<MDL	<MDL	<MDL	
18	SAL-03D	09/13/00	5.67E+03	1.5E+03	<MDL	<MDL	<MDL	<MDL	1
19	OAS-03	09/13/00	1.09E+03	2.8E+02	7.15E+02	4.21E+02	1.14E+03	2.50E+02	1
20	CHU-03	09/13/00	3.66E+03	9.4E+02	8.46E+02	8.57E+02	1.70E+03	3.75E+02	
21	CHU-03D	09/13/00	3.41E+03	8.8E+02	7.44E+02	7.37E+02	1.48E+03	3.26E+02	
22	LJE-03	09/13/00	2.84E+04	7.3E+03	<MDL	<MDL	<MDL	<MDL	1
23	LJE-03D	09/13/00	3.26E+04	8.4E+03	3.67E+02	1.98E+02	5.65E+02	1.24E+02	
24	PMS-03	09/13/00	4.29E+03	1.1E+03	<MDL	<MDL	<MDL	<MDL	
25	PMS-03D	09/13/00	4.33E+03	1.1E+03	<MDL	Det	Det	Det	
26	SES-03	09/13/00	1.02E+04	2.6E+03	1.79E+02	2.25E+02	4.04E+02	8.90E+01	**
27	SAL-04	09/14/00	3.75E+03	9.7E+02	<MDL	<MDL	<MDL	<MDL	
28	OAS-04	09/14/00	8.53E+02	2.2E+02	2.12E+02	1.52E+02	3.64E+02	8.01E+01	
29	CHU-04	09/14/00	1.93E+03	5.0E+02	<MDL	<MDL	<MDL	<MDL	
30	LJE-04	09/14/00	1.75E+04	4.5E+03	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
31	PMS-04	09/14/00	1.70E+04	4.4E+03	2.69E+02	2.53E+02	5.22E+02	1.15E+02	
32	SES-04	09/14/00	1.76E+04	4.5E+03	8.91E+01	9.94E+01	1.88E+02	4.15E+01	
33	SES-04D	09/14/00	1.89E+04	4.9E+03	9.80E+01	9.07E+01	1.89E+02	4.16E+01	
34	SAL-05	09/18/00	5.61E+03	1.4E+03	Det	Det	Det	Det	
35	OAS-05	09/18/00	1.63E+03	4.2E+02	Det	Det	Det	Det	
36	CHU-05	09/18/00	2.27E+03	5.8E+02	4.06E+02	4.10E+02	8.16E+02	1.80E+02	
37	LJE-05	09/18/00	4.30E+04	1.1E+04	<MDL	<MDL	<MDL	<MDL	
38	PMS-05	09/18/00	4.36E+04	1.1E+04	1.72E+03	1.88E+03	3.59E+03	7.92E+02	
39	SES-05	09/18/00	1.52E+04	3.9E+03	<MDL	Det	Det	Det	**
40	SAL06	09/19/00	1.36E+04	3.5E+03	<MDL	<MDL	<MDL	<MDL	
41	OAS-06	09/19/00	2.51E+03	6.5E+02	Det	Det	Det	Det	
42	CHU-06	09/19/00	8.36E+03	2.2E+03	3.00E+02	3.15E+02	6.15E+02	1.35E+02	
43	LJE-06	09/19/00	4.60E+04	1.2E+04	<MDL	<MDL	<MDL	<MDL	
44	PMS-06	09/19/00	6.00E+04	1.5E+04	3.43E+02	3.33E+02	6.76E+02	1.49E+02	
45	SES-06	09/19/00	2.80E+04	7.2E+03	1.25E+02	1.47E+02	2.72E+02	5.99E+01	
46	SAL-07	09/20/00	6.88E+03	1.8E+03	<MDL	<MDL	<MDL	<MDL	
47	SAL-07D	09/20/00	5.78E+03	1.5E+03	<MDL	<MDL	<MDL	<MDL	
48	OAS-07	09/20/00	2.44E+03	6.3E+02	5.98E+01	1.05E+02	1.65E+02	3.63E+01	
49	OAS-07D	09/20/00	2.10E+03	5.4E+02	8.08E+01	1.58E+02	2.39E+02	5.26E+01	
50	CHU-07	09/20/00	6.31E+03	1.6E+03	<MDL	<MDL	<MDL	<MDL	**
51	CHU-07D	09/20/00	2.75E+03	7.1E+02	<MDL	<MDL	<MDL	<MDL	
52	LJE-07	09/20/00	6.10E+03	1.6E+03	<MDL	<MDL	<MDL	<MDL	
53	LJE-07D	09/20/00	9.63E+03	2.5E+03	<MDL	<MDL	<MDL	<MDL	
54	PMS-07	09/20/00	7.73E+03	2.0E+03	<MDL	<MDL	<MDL	<MDL	
55	PMS-07D	09/20/00	5.06E+03	1.3E+03	<MDL	<MDL	<MDL	<MDL	
56	SES-07	09/20/00	6.16E+02	1.6E+02	<MDL	<MDL	<MDL	<MDL	
57	SES-07D	09/20/00	5.39E+02	1.4E+02	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
58	SAL-08	09/21/00	1.06E+04	2.7E+03	<MDL	<MDL	<MDL	<MDL	
59	OAS-08	09/21/00	2.34E+02	6.0E+01	<MDL	<MDL	<MDL	<MDL	
60	CHU-08	09/21/00	3.27E+03	8.4E+02	Det	Det	Det	Det	
61	LJE -08	09/21/00	NA	NA	NA	NA	NA	NA	
62	PMS-08	09/21/00	1.51E+04	3.9E+03	<MDL	<MDL	<MDL	<MDL	
63	SES-08	09/21/00	8.14E+02	2.1E+02	<MDL	<MDL	<MDL	<MDL	
64	SAL-09	09/25/00	5.72E+02	1.5E+02	<MDL	<MDL	<MDL	<MDL	
65	OAS-09	09/25/00	4.81E+02	1.2E+02	<MDL	Det	Det	Det	**
66	CHU-09	09/25/00	4.66E+02	1.2E+02	<MDL	<MDL	<MDL	<MDL	
67	LJE-09	09/25/00	1.17E+03	3.0E+02	<MDL	<MDL	<MDL	<MDL	
68	PMS-09	09/25/00	4.83E+03	1.2E+03	<MDL	<MDL	<MDL	<MDL	
69	SES-09	09/25/00	4.72E+03	1.2E+03	<MDL	<MDL	<MDL	<MDL	
71	SAL-10D	09/26/00	1.01E+03	2.6E+02	<MDL	<MDL	<MDL	<MDL	
72	OAS-10	09/26/00	5.77E+02	1.5E+02	<MDL	Det	Det	Det	
73	OAS-10D	09/26/00	6.04E+02	1.6E+02	<MDL	<MDL	<MDL	<MDL	
74	CHU-10	09/26/00	1.25E+03	3.2E+02	<MDL	<MDL	<MDL	<MDL	
75	CHU-10D	09/26/00	1.28E+03	3.3E+02	<MDL	<MDL	<MDL	<MDL	**
76	LJE-10	09/26/00	2.31E+03	6.0E+02	<MDL	<MDL	<MDL	<MDL	
77	LJE-10D	09/26/00	3.08E+03	7.9E+02	<MDL	<MDL	<MDL	<MDL	**
78	PMS-10	09/26/00	1.06E+04	2.7E+03	<MDL	<MDL	<MDL	<MDL	
79	PMS-10D	09/26/00	1.38E+04	3.6E+03	<MDL	<MDL	<MDL	<MDL	
80	SES-10	09/26/00	3.20E+03	8.2E+02	<MDL	<MDL	<MDL	<MDL	
81	SES-10D	09/26/00	3.11E+03	8.0E+02	<MDL	<MDL	<MDL	<MDL	
82	SAL-11	09/27/00	2.94E+02	7.6E+01	<MDL	<MDL	<MDL	<MDL	
83	OAS-11	09/27/00	9.66E+02	2.5E+02	<MDL	<MDL	<MDL	<MDL	
84	CHU-11	09/27/00	8.92E+02	2.3E+02	<MDL	<MDL	<MDL	<MDL	
85	LJE-11	09/27/00	1.04E+03	2.7E+02	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene	
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)
86	PMS-11	09/27/00	5.16E+04	1.3E+04	<MDL	<MDL	<MDL	<MDL
87	SES-11	09/27/00	6.56E+03	1.7E+03	<MDL	Det	Det	Det
89	SAL-12	09/28/00	1.00E+04	2.6E+03	<MDL	<MDL	<MDL	<MDL
90	OAS-12	09/28/00	6.26E+02	1.6E+02	<MDL	<MDL	<MDL	<MDL
91	CHU-12	09/28/00	2.62E+03	6.8E+02	<MDL	<MDL	<MDL	<MDL
92	LJE-12	09/28/00	1.44E+04	3.7E+03	<MDL	<MDL	<MDL	<MDL
93	PMS-12	09/28/00	8.33E+04	2.1E+04	Det	Det	Det	Det
94	SES-12	09/28/00	1.60E+04	4.1E+03	<MDL	<MDL	<MDL	<MDL
95	SAL-13	10/02/00	7.30E+02	1.9E+02	<MDL	<MDL	<MDL	<MDL
96	OAS-13	10/02/00	1.11E+03	2.9E+02	<MDL	<MDL	<MDL	<MDL
97	CHU-13	10/02/00	1.43E+03	3.7E+02	<MDL	<MDL	<MDL	<MDL
98	LJE-13	10/02/00	7.61E+02	2.0E+02	<MDL	<MDL	<MDL	<MDL
99	PMS-13	10/02/00	3.02E+03	7.8E+02	<MDL	<MDL	<MDL	<MDL
100	SES-13	10/02/00	3.35E+03	8.6E+02	<MDL	<MDL	<MDL	<MDL
101	SAL-14	10/03/00	3.52E+02	9.1E+01	<MDL	<MDL	<MDL	<MDL
102	SAL-14D	10/03/00	3.47E+02	9.0E+01	<MDL	<MDL	<MDL	<MDL
103	OAS-14	10/03/00	1.62E+03	4.2E+02	<MDL	<MDL	<MDL	<MDL
104	CHU-14	10/03/00	1.20E+03	3.1E+02	<MDL	<MDL	<MDL	<MDL
105	CHU-14D	10/03/00	1.19E+03	3.1E+02	<MDL	<MDL	<MDL	<MDL
106	LJE-14	10/03/00	4.76E+02	1.2E+02	<MDL	<MDL	<MDL	<MDL
107	LJE-14D	10/03/00	4.84E+02	1.2E+02	<MDL	<MDL	<MDL	<MDL
108	PMS-14	10/03/00	4.43E+03	1.1E+03	<MDL	<MDL	<MDL	<MDL
109	PMS-14D	10/03/00	3.55E+03	9.1E+02	<MDL	<MDL	<MDL	<MDL
110	SES-14	10/03/00	1.84E+03	4.7E+02	<MDL	<MDL	<MDL	<MDL
111	SES-14D	10/03/00	1.85E+03	4.8E+02	<MDL	<MDL	<MDL	<MDL
112	SAL-15	10/04/00	4.17E+03	1.1E+03	<MDL	<MDL	<MDL	<MDL
113	OAS-15	10/04/00	1.31E+03	3.4E+02	<MDL	<MDL	<MDL	<MDL

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation < 5%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

† corrected for MeBr

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
114	OAS-15D	10/04/00	1.32E+03	3.4E+02	<MDL	<MDL	<MDL	<MDL	
115	CHU-15	10/04/00	2.36E+03	6.1E+02	<MDL	<MDL	<MDL	<MDL	
116	LJE-15	10/04/00	1.65E+04	4.3E+03	<MDL	<MDL	<MDL	<MDL	
117	PMS-15	10/04/00	4.91E+03	1.3E+03	<MDL	<MDL	<MDL	<MDL	
118	SES-15	10/04/00	1.69E+03	4.4E+02	<MDL	<MDL	<MDL	<MDL	
119	SAL-16	10/05/00	2.51E+03	6.5E+02	<MDL	<MDL	<MDL	<MDL	
120	OAS-16	10/05/00	2.14E+03	5.5E+02	<MDL	<MDL	<MDL	<MDL	
121	CHU-16	10/05/00	1.18E+03	3.0E+02	<MDL	<MDL	<MDL	<MDL	
122	LJE-16	10/05/00	3.13E+03	8.1E+02	<MDL	<MDL	<MDL	<MDL	
123	PMS-16	10/05/00	7.36E+03	1.9E+03	<MDL	<MDL	<MDL	<MDL	
124	SES-16	10/05/00	8.88E+03	2.3E+03	<MDL	<MDL	<MDL	<MDL	
126	SAL-17	10/10/00	2.38E+02	6.1E+01	<MDL	<MDL	<MDL	<MDL	**
127	OAS-17	10/10/00	4.78E+02	1.2E+02	<MDL	<MDL	<MDL	<MDL	**
128	CHU-17	10/10/00	2.86E+02	7.4E+01	<MDL	<MDL	<MDL	<MDL	
129	LJE-17	10/10/00	2.67E+03	6.9E+02	<MDL	<MDL	<MDL	<MDL	
130	PMS-17	10/10/00	2.11E+04	5.4E+03	<MDL	<MDL	<MDL	<MDL	
131	SES-17	10/10/00	3.73E+03	9.6E+02	<MDL	<MDL	<MDL	<MDL	
132	SES-17D	10/10/00	4.14E+03	1.1E+03	<MDL	<MDL	<MDL	<MDL	
133	SAL-18	10/11/00	1.49E+03	3.8E+02	<MDL	<MDL	<MDL	<MDL	
134	SAL-18D	10/11/00	1.52E+03	3.9E+02	<MDL	<MDL	<MDL	<MDL	
135	OAS-18	10/11/00	1.28E+03	3.3E+02	<MDL	Det	Det	Det	
136	CHU-18	10/11/00	1.48E+03	3.8E+02	<MDL	<MDL	<MDL	<MDL	
137	CHU-18D	10/11/00	1.94E+02	5.0E+01	<MDL	<MDL	<MDL	<MDL	**
138	LJE-18	10/11/00	2.40E+03	6.2E+02	<MDL	<MDL	<MDL	<MDL	
139	LJE-18D	10/11/00	9.61E+02	2.5E+02	<MDL	<MDL	<MDL	<MDL	**
140	PMS-18	10/11/00	5.09E+04	1.3E+04	<MDL	<MDL	<MDL	<MDL	
141	PMS-18D	10/11/00	4.87E+04	1.3E+04	<MDL	Det	Det	Det	**

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
142	SES-18	10/11/00	2.00E+03	5.2E+02	<MDL	<MDL	<MDL	<MDL	
143	SAL-19	10/12/00	6.39E+03	1.6E+03	<MDL	<MDL	<MDL	<MDL	
144	OAS-19	10/12/00	1.10E+03	2.8E+02	<MDL	<MDL	<MDL	<MDL	
145	OAS-19D	10/12/00	1.14E+03	2.9E+02	<MDL	<MDL	<MDL	<MDL	
146	CHU-19	10/12/00	1.29E+03	3.3E+02	<MDL	<MDL	<MDL	<MDL	
147	LJE-19	10/12/00	4.64E+03	1.2E+03	<MDL	<MDL	<MDL	<MDL	
148	LJE-19D	10/12/00	4.39E+03	1.1E+03	<MDL	<MDL	<MDL	<MDL	
149	PMS-19	10/12/00	1.09E+05	2.8E+04	4.52E+01	Det	4.52E+01	9.96E+00	
150	SES-19	10/12/00	3.59E+03	9.2E+02	<MDL	<MDL	<MDL	<MDL	
152	SAL-20	10/16/00	3.07E+04	7.9E+03	2.22E+02	1.29E+02	3.51E+02	7.73E+01	
153	OAS-20	10/16/00	3.50E+03	9.0E+02	<MDL	<MDL	<MDL	<MDL	
154	OAS-20D	10/16/00	3.66E+03	9.4E+02	<MDL	<MDL	<MDL	<MDL	
155	CHU-20	10/16/00	9.36E+03	2.4E+03	4.55E+01	Det	4.55E+01	1.00E+01	
156	LJE-20	10/16/00	4.17E+04	1.1E+04	Det	Det	Det	Det	
157	LJE-20D	10/16/00	5.11E+04	1.3E+04	Det	Det	Det	Det	
158	PMS-20	10/16/00	8.64E+04	2.2E+04	5.31E+01	Det	5.31E+01	1.17E+01	
159	PMS-20D	10/16/00	8.93E+04	2.3E+04	<MDL	<MDL	<MDL	<MDL	**
160	SES-20	10/16/00	1.26E+04	3.2E+03	<MDL	<MDL	<MDL	<MDL	**
161	SES-20D	10/16/00	1.27E+04	3.3E+03	<MDL	<MDL	<MDL	<MDL	
162	SAL-21	10/17/00	4.69E+03	1.2E+03	1.50E+02	1.02E+02	2.52E+02	5.56E+01	
163	OAS-21	10/17/00	2.23E+03	5.7E+02	<MDL	<MDL	<MDL	<MDL	
164	CHU-21	10/17/00	4.96E+03	N.A.	2.88E+02	2.02E+02	4.90E+02	1.08E+02	
165	CHU-21D	10/17/00	5.00E+03	1.3E+03	2.87E+02	2.10E+02	4.98E+02	1.10E+02	
166	LJE-21	10/17/00	8.27E+03	2.1E+03	5.66E+01	Det	5.66E+01	1.25E+01	
167	PMS-21	10/17/00	1.53E+04	3.9E+03	<MDL	<MDL	<MDL	<MDL	
168	SES-21	10/17/00	1.15E+04	3.0E+03	<MDL	<MDL	<MDL	<MDL	
169	SAL-22	10/18/00	3.01E+03	7.8E+02	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
170	SAL-22D	10/18/00	3.15E+03	8.1E+02	<MDL	<MDL	<MDL	<MDL	
171	OAS-22	10/18/00	2.72E+03	7.0E+02	Det	Det	Det	Det	
172	CHU-22	10/18/00	4.68E+03	1.2E+03	5.27E+02	4.48E+02	9.75E+02	2.15E+02	
173	LJE-22	10/18/00	1.37E+04	3.5E+03	<MDL	<MDL	<MDL	<MDL	
174	PMS-22	10/18/00	2.66E+04	6.9E+03	<MDL	<MDL	<MDL	<MDL	
175	SES-22	10/18/00	1.85E+04	4.8E+03	Det	Det	Det	Det	
177	SAL-23	10/19/00	8.23E+03	2.1E+03	Det	6.03E+01	6.03E+01	1.33E+01	
178	OAS-23	10/19/00	7.13E+03	1.8E+03	<MDL	4.87E+00	4.87E+00	1.07E+00	
179	CHU-23	10/19/00	5.98E+03	1.5E+03	1.68E+02	2.45E+02	4.13E+02	9.10E+01	
180	LJE-23	10/19/00	1.43E+04	3.7E+03	Det	Det	Det	Det	
181	PMS-23	10/19/00	1.61E+04	4.1E+03	5.04E+01	4.34E+01	9.38E+01	2.07E+01	
182	SES-23	10/19/00	1.37E+04	3.5E+03	9.06E+01	<MDL	9.06E+01	2.00E+01	
184	SAL-24	10/23/00	9.23E+03	2.4E+03	<MDL	<MDL	<MDL	<MDL	
185	OAS-24	10/23/00	2.41E+03	6.2E+02	<MDL	Det	Det	Det	
186	CHU-24	10/23/00	4.41E+03	1.1E+03	Det	Det	Det	Det	
187	LJE-24	10/23/00	2.73E+04	7.0E+03	Det	Det	Det	Det	
188	PMS-24	10/23/00	1.19E+05	3.1E+04	1.59E+03	1.43E+03	3.02E+03	6.66E+02	
189	SES-24	10/23/00	1.27E+04	3.3E+03	<MDL	Det	Det	Det	
190	SAL-25	10/24/00	4.77E+03	1.2E+03	<MDL	<MDL	<MDL	<MDL	
191	OAS-25	10/24/00	2.30E+03	5.9E+02	<MDL	<MDL	<MDL	<MDL	
192	CHU-25	10/24/00	2.21E+03	5.7E+02	<MDL	<MDL	<MDL	<MDL	
193	LJE-25	10/24/00	4.85E+03	1.3E+03	<MDL	<MDL	<MDL	<MDL	**
194	PMS-25	10/24/00	3.28E+04	8.5E+03	2.19E+02	2.17E+02	4.36E+02	9.60E+01	
195	SES-25	10/24/00	4.67E+03	1.2E+03	<MDL	Det	Det	Det	
196	SAL-26D	10/25/00	2.52E+03	6.5E+02	5.81E+01	Det	5.81E+01	1.28E+01	
197	SAL-26	10/25/00	2.47E+03	6.4E+02	4.52E+01	<MDL	4.52E+01	9.96E+00	
198	OAS-26	10/25/00	8.71E+02	2.2E+02	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene	
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)
199	OAS-26D	10/25/00	8.86E+02	2.3E+02	<MDL	<MDL	<MDL	<MDL
200	CHU-26	10/25/00	1.16E+03	3.0E+02	8.13E+01	Det	8.13E+01	1.79E+01
201	CHU-26D	10/25/00	1.15E+03	3.0E+02	8.52E+01	Det	8.52E+01	1.88E+01
202	LJE-26	10/25/00	2.98E+03	7.7E+02	7.13E+01	Det	7.13E+01	1.57E+01
203	LJE-26D	10/25/00	3.06E+03	7.9E+02	6.66E+01	Det	6.66E+01	1.47E+01
204	PMS-26	10/25/00	1.19E+04	3.1E+03	Det	Det	Det	Det
205	PMS-26D	10/25/00	1.12E+04	2.9E+03	Det	Det	Det	Det
206	SES-26	10/25/00	8.18E+03	2.1E+03	<MDL	<MDL	<MDL	<MDL
207	SES-26D	10/25/00	8.65E+03	2.2E+03	<MDL	<MDL	<MDL	<MDL
208	SAL-27	10/26/00	2.12E+03	5.5E+02	<MDL	Det	Det	Det
209	OAS-27	10/26/00	4.69E+02	1.2E+02	1.36E+02	2.94E+02	4.30E+02	9.48E+01
210	CHU-27	10/26/00	1.32E+03	3.4E+02	<MDL	<MDL	<MDL	<MDL
211	LJE-27	10/26/00	4.87E+03	1.3E+03	<MDL	<MDL	<MDL	<MDL
212	PMS-27	10/26/00	9.90E+03	2.6E+03	<MDL	<MDL	<MDL	<MDL
213	SES-27	10/26/00	5.13E+03	1.3E+03	<MDL	Det	Det	Det
214	SAL-28	10/30/00	3.91E+02	1.0E+02	<MDL	<MDL	<MDL	<MDL
215	OAS-28	10/30/00	2.61E+02	6.7E+01	<MDL	<MDL	<MDL	<MDL
216	CHU-28	10/30/00	4.40E+02	1.1E+02	<MDL	<MDL	<MDL	<MDL
217	LJE-28	10/30/00	7.61E+02	2.0E+02	<MDL	<MDL	<MDL	<MDL
218	PMS-28	10/30/00	2.10E+03	5.4E+02	<MDL	<MDL	<MDL	<MDL
219	SES-28	10/30/00	3.15E+02	8.1E+01	<MDL	<MDL	<MDL	<MDL
220	SAL-29	10/31/00	5.01E+02	1.3E+02	<MDL	<MDL	<MDL	<MDL
221	OAS-29	10/31/00	4.01E+02	1.0E+02	<MDL	<MDL	<MDL	<MDL
222	CHU-29	10/31/00	4.37E+02	1.1E+02	<MDL	Det	Det	Det
223	LJE-29	10/31/00	1.22E+03	3.1E+02	<MDL	<MDL	<MDL	<MDL
224	PMS-29	10/31/00	6.90E+03	1.8E+03	<MDL	<MDL	<MDL	<MDL
225	SES-29	10/31/00	1.04E+03	2.7E+02	<MDL	<MDL	<MDL	<MDL

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= \geq MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1. see text for MDLs

Table 2. Methyl Bromide and 1,3-Dichloropropene Monitoring Results (Canisters) for Monterey/Santa Cruz Counties

Log #	Sample I.D.	Sample Start Date	Methyl Bromide		cis 1,3-Dichloropropene (ng/m3)	trans 1,3-Dichloropropene (ng/m3)	Total 1,3-Dichloropropene		
			(ng/m3)	*(pptv)			(ng/m3)	*(pptv)	
226	SAL-30	11/01/00	5.52E+02	1.4E+02	<MDL	<MDL	<MDL	<MDL	
227	SAL-30D	11/01/00	5.43E+02	1.4E+02	<MDL	<MDL	<MDL	<MDL	
228	OAS-30	11/01/00	2.63E+02	6.8E+01	<MDL	<MDL	<MDL	<MDL	
229	OAS-30D	11/01/00	2.41E+02	6.2E+01	<MDL	<MDL	<MDL	<MDL	
230	CHU-30	11/01/00	3.33E+02	8.6E+01	<MDL	<MDL	<MDL	<MDL	
231	CHU-30D	11/01/00	3.22E+02	8.3E+01	<MDL	<MDL	<MDL	<MDL	
232	LJE-30	11/01/00	7.92E+02	2.0E+02	<MDL	<MDL	<MDL	<MDL	
233	LJE-30D	11/01/00	7.83E+02	2.0E+02	<MDL	<MDL	<MDL	<MDL	
234	PMS-30	11/01/00	6.62E+03	1.7E+03	Det	Det	Det	Det	
235	PMS-30D	11/01/00	6.76E+03	1.7E+03	Det	Det	Det	Det	
236	SES-30	11/01/00	6.20E+02	1.6E+02	<MDL	<MDL	<MDL	<MDL	
237	SES-30D	11/01/00	6.32E+02	1.6E+02	<MDL	<MDL	<MDL	<MDL	
238	SAL-31	11/02/00	7.49E+02	1.9E+02	Det	<MDL	Det	Det	
240	OAS-31	11/02/00	2.98E+02	7.7E+01	1.13E+03	3.33E+02	1.47E+03	3.23E+02	
241	CHU-31	11/02/00	4.21E+02	1.1E+02	4.16E+02	1.34E+02	5.50E+02	1.21E+02	
242	LJE-31	11/02/00	1.15E+03	3.0E+02	4.75E+01	Det	4.75E+01	1.05E+01	
243	PMS-31	11/02/00	1.48E+03	3.8E+02	<MDL	<MDL	<MDL	<MDL	
244	SES-31	11/02/00	1.41E+03	3.6E+02	<MDL	<MDL	<MDL	<MDL	

MDL= 7.1 ng/m3 for MeBr

EQL= 36 ng/m3; Det= ≥ MDL but < EQL

NA= Not Analyzed

*pptv at 1 atm and 25 C

**flow rate deviation >25%

cis 1,3-DCP MDL= 8.5 ng/m3

EQL= 42 ng/m3

trans 1,3-DCP MDL= 12 ng/m3

EQL = 60 ng/m3

1- see text for MDLs

Table 3. Summary of 1,3-Dichloropropene (Total) Canister Results (ng/m3)

Monterey and Santa Cruz Counties

Sample Start Date	CHU	LJE	OAS	PMS	SAL	SES
09/11/00	2.28E+03	<MDL	2.80E+02	3.11E+02	9.10E+01	<MDL
09/12/00	4.34E+03	<MDL	6.41E+02	2.59E+02	<MDL	<MDL
09/13/00	1.70E+03	5.65E+02	1.14E+03	Det	<MDL	**
09/14/00	<MDL	<MDL	3.64E+02	5.22E+02	<MDL	1.89E+02
09/18/00	8.16E+02	<MDL	Det	3.59E+03	Det	**
09/19/00	6.15E+02	<MDL	Det	6.76E+02	<MDL	2.72E+02
09/20/00	<MDL	<MDL	2.39E+02	<MDL	<MDL	<MDL
09/21/00	Det	NA	<MDL	<MDL	<MDL	<MDL
09/25/00	<MDL	<MDL	**	<MDL	<MDL	<MDL
09/26/00	<MDL	<MDL	Det	<MDL	<MDL	<MDL
09/27/00	<MDL	<MDL	<MDL	<MDL	<MDL	Det
09/28/00	<MDL	<MDL	<MDL	Det	<MDL	<MDL
10/02/00	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
10/03/00	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
10/04/00	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
10/05/00	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
10/10/00	<MDL	<MDL	**	<MDL	**	<MDL
10/11/00	<MDL	<MDL	Det	Det	<MDL	<MDL
10/12/00	<MDL	<MDL	<MDL	4.52E+01	<MDL	<MDL
10/16/00	4.55E+01	Det	<MDL	5.31E+01	3.51E+02	<MDL
10/17/00	4.98E+02	5.66E+01	<MDL	<MDL	2.52E+02	<MDL
10/18/00	9.75E+02	<MDL	Det	<MDL	<MDL	Det
10/19/00	4.13E+02	Det	4.87E+00	9.38E+01	6.03E+01	9.06E+01
10/23/00	Det	Det	Det	3.02E+03	<MDL	Det
10/24/00	<MDL	**	<MDL	4.36E+02	<MDL	Det
10/25/00	8.52E+01	7.13E+01	<MDL	Det	5.81E+01	<MDL
10/26/00	<MDL	<MDL	4.30E+02	<MDL	Det	Det
10/30/00	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
10/31/00	Det	<MDL	<MDL	<MDL	<MDL	<MDL
11/01/00	<MDL	<MDL	<MDL	Det	<MDL	<MDL
11/02/00	5.50E+02	4.75E+01	1.47E+03	<MDL	Det	<MDL

Maximum	4340	565	1470	3590	351	272
Average	409	39	175	304	42	39
# Samples	31	29	29	31	30	29
# >EQL	11	4	8	10	5	3
# Det	3	3	6	5	3	5
# <MDL	17	22	15	16	22	21

Only the higher value of each collocated pair is listed above.

<MDL results were factored into the average as MDL/2 = 10 ng/m3.

DET results were factored into the average as (MDL + EQL)/2 = 61 ng/m3

**Sample flow rate deviation was >25%

Table 4. Summary of Methyl Bromide Canister Results (ng/m3)
Monterey and Santa Cruz Counties

Sample Start Date	CHU	LJE	OAS	PMS	SAL	SES
09/11/00	2.58E+03	2.16E+04	1.22E+03	1.97E+04	7.67E+03	3.67E+04
09/12/00	3.13E+03	9.33E+04	2.71E+03	3.92E+04	8.28E+03	6.37E+04
09/13/00	3.66E+03	3.26E+04	1.09E+03	4.33E+03	5.82E+03	**
09/14/00	1.93E+03	1.75E+04	8.53E+02	1.70E+04	3.75E+03	1.89E+04
09/18/00	2.27E+03	4.30E+04	1.63E+03	4.36E+04	5.61E+03	**
09/19/00	8.36E+03	4.60E+04	2.51E+03	6.00E+04	1.36E+04	2.80E+04
09/20/00	2.75E+03	9.63E+03	2.44E+03	7.73E+03	6.88E+03	6.16E+02
09/21/00	3.27E+03	NA	2.34E+02	1.51E+04	1.06E+04	8.14E+02
09/25/00	4.66E+02	1.17E+03	**	4.83E+03	5.72E+02	4.72E+03
09/26/00	1.25E+03	2.31E+03	6.04E+02	1.38E+04	1.01E+03	3.20E+03
09/27/00	8.92E+02	1.04E+03	9.66E+02	5.16E+04	2.94E+02	6.56E+03
09/28/00	2.62E+03	1.44E+04	6.26E+02	8.33E+04	1.00E+04	1.60E+04
10/02/00	1.43E+03	7.61E+02	1.11E+03	3.02E+03	7.30E+02	3.35E+03
10/03/00	1.20E+03	4.84E+02	1.62E+03	4.43E+03	3.52E+02	1.85E+03
10/04/00	2.36E+03	1.65E+04	1.32E+03	4.91E+03	4.17E+03	1.69E+03
10/05/00	1.18E+03	3.13E+03	2.14E+03	7.36E+03	2.51E+03	8.88E+03
10/10/00	2.86E+02	2.67E+03	**	2.11E+04	**	4.14E+03
10/11/00	1.48E+03	2.40E+03	1.28E+03	5.09E+04	1.52E+03	2.00E+03
10/12/00	1.29E+03	4.64E+03	1.14E+03	1.09E+05	6.39E+03	3.59E+03
10/16/00	9.36E+03	5.11E+04	3.66E+03	8.64E+04	3.07E+04	1.27E+04
10/17/00	5.00E+03	8.27E+03	2.23E+03	1.53E+04	4.69E+03	1.15E+04
10/18/00	4.68E+03	1.37E+04	2.72E+03	2.66E+04	3.15E+03	1.85E+04
10/19/00	5.98E+03	1.43E+04	7.13E+03	1.61E+04	8.23E+03	1.37E+04
10/23/00	4.41E+03	2.73E+04	2.41E+03	1.19E+05	9.23E+03	1.27E+04
10/24/00	2.21E+03	**	2.30E+03	3.28E+04	4.77E+03	4.67E+03
10/25/00	1.16E+03	3.06E+03	8.86E+02	1.19E+04	2.52E+03	8.65E+03
10/26/00	1.32E+03	4.87E+03	4.69E+02	9.90E+03	2.12E+03	5.13E+03
10/30/00	4.40E+02	7.61E+02	2.61E+02	2.10E+03	3.91E+02	3.15E+02
10/31/00	4.37E+02	1.22E+03	4.01E+02	6.90E+03	5.01E+02	1.04E+03
11/01/00	3.33E+02	7.92E+02	2.63E+02	6.76E+03	5.52E+02	6.32E+02
11/02/00	4.21E+02	1.15E+03	2.98E+02	1.48E+03	7.49E+02	1.41E+03

Maximum	9360	93300	7130	119000	30700	63700
Average	2520	15200	1600	28900	5250	10200
# Samples	31	29	29	31	30	29
# >EQL	31	29	29	31	30	29
# Det	0	0	0	0	0	0
# <MDL	0	0	0	0	0	0

Only the higher value of each collocated pair is listed above.

**Sample flow rate deviation was >25%

Table 5. Methyl Bromide and 1,3-Dichloropropene Canister Collocated Results

Sample I.D.	Methyl Bromide			Total 1,3-Dichloropropene		
	(ng/m3)	Average	Rel. Diff.	(ng/m3)	Average	Rel. Diff.
CHU-03	3.66E+03	3.53E+03	7.1%	1.70E+03	1.59E+03	14%
CHU-03D	3.41E+03			1.48E+03		
CHU-07	**	NA	NA	**	NA	NA
CHU-07D	2.75E+03			<MDL		
CHU-10	1.25E+03	NA	NA	<MDL	NA	NA
CHU-10D	**			**		
CHU-14	1.20E+03	1.20E+03	0.7%	<MDL	<MDL	NA
CHU-14D	1.19E+03			<MDL		
CHU-18	1.48E+03	NA	NA	<MDL	NA	NA
CHU-18D	**			**		
CHU-21	4.96E+03	4.98E+03	0.8%	4.90E+02	4.94E+02	1.5%
CHU-21D	5.00E+03			4.98E+02		
CHU-26	1.16E+03	1.16E+03	0.8%	8.13E+01	8.33E+01	4.7%
CHU-26D	1.15E+03			8.52E+01		
CHU-30	3.33E+02	3.28E+02	3.4%	<MDL	<MDL	NA
CHU-30D	3.22E+02			<MDL		
LJE-03	2.84E+04	3.05E+04	14%	<MDL	NA	NA
LJE-03D	3.26E+04			5.65E+02		
LJE-07	6.10E+03	7.86E+03	45%	<MDL	<MDL	NA
LJE-07D	9.63E+03			<MDL		
LJE-10	2.31E+03	NA	NA	<MDL	NA	NA
LJE-10D	**			**		
LJE-14	4.76E+02	4.80E+02	1.6%	<MDL	<MDL	NA
LJE-14D	4.84E+02			<MDL		
LJE-18	2.40E+03	NA	NA	<MDL	NA	NA
LJE-18D	**			**		
LJE-19	4.64E+03	4.52E+03	5.4%	<MDL	<MDL	NA
LJE-19D	4.39E+03			<MDL		
LJE-20	4.17E+04	4.64E+04	20%	Det	Det	NA
LJE-20D	5.11E+04			Det		
LJE-26	2.98E+03	3.02E+03	2.7%	7.13E+01	6.90E+01	6.9%
LJE-26D	3.06E+03			6.66E+01		
LJE-30	7.92E+02	7.87E+02	1.2%	<MDL	<MDL	NA
LJE-30D	7.83E+02			<MDL		
OAS-02	2.62E+03	2.66E+03	3.3%	5.93E+02	6.17E+02	7.9%
OAS-02D	2.71E+03			6.41E+02		
OAS-07	2.44E+03	2.27E+03	15%	1.65E+02	2.02E+02	37%
OAS-07D	2.10E+03			2.39E+02		
OAS-10	5.77E+02	5.90E+02	4.7%	Det	NA	NA
OAS-10D	6.04E+02			<MDL		
OAS-15	1.31E+03	1.32E+03	0.9%	<MDL	<MDL	NA
OAS-15D	1.32E+03			<MDL		
OAS-19	1.10E+03	1.12E+03	3.8%	<MDL	<MDL	NA
OAS-19D	1.14E+03			<MDL		

Table 5. Methyl Bromide and 1,3-Dichloropropene Canister Collocated Results

Sample I.D.	Methyl Bromide			Total 1,3-Dichloropropene		
	(ng/m3)	Average	Rel. Diff.	(ng/m3)	Average	Rel. Diff.
OAS-20	3.50E+03	3.58E+03	4.5%	<MDL	<MDL	NA
OAS-20D	3.66E+03			<MDL		
OAS-26	8.71E+02	8.78E+02	1.7%	<MDL	<MDL	NA
OAS-26D	8.86E+02			<MDL		
OAS-30	2.63E+02	2.52E+02	8.6%	<MDL	<MDL	NA
OAS-30D	2.41E+02			<MDL		
PMS-03	4.29E+03	4.31E+03	1.1%	<MDL	NA	NA
PMS-03D	4.33E+03			Det		
PMS-07	7.73E+03	6.39E+03	42%	<MDL	<MDL	NA
PMS-07D	5.06E+03			<MDL		
PMS-10	1.06E+04	1.22E+04	27%	<MDL	<MDL	NA
PMS-10D	1.38E+04			<MDL		
PMS-14	4.43E+03	3.99E+03	22%	<MDL	<MDL	NA
PMS-14D	3.55E+03			<MDL		
PMS-18	5.09E+04	NA	NA	<MDL	NA	NA
PMS-18D	**			**		
PMS-20	8.64E+04	NA	NA	5.31E+01	NA	NA
PMS-20D	**			**		
PMS-26	1.19E+04	1.16E+04	5.8%	Det	Det	NA
PMS-26D	1.12E+04			Det		
PMS-30	6.62E+03	6.69E+03	2.1%	Det	Det	NA
PMS-30D	6.76E+03			Det		
SAL-03	5.82E+03	5.74E+03	2.6%	<MDL	<MDL	NA
SAL-03D	5.67E+03			<MDL		
SAL-07	6.88E+03	6.33E+03	17%	<MDL	<MDL	NA
SAL-07D	5.78E+03			<MDL		
SAL-14	3.52E+02	3.50E+02	1.4%	<MDL	<MDL	NA
SAL-14D	3.47E+02			<MDL		
SAL-18	1.49E+03	1.50E+03	2.4%	<MDL	<MDL	NA
SAL-18D	1.52E+03			<MDL		
SAL-22	3.01E+03	3.08E+03	4.3%	<MDL	<MDL	NA
SAL-22D	3.15E+03			<MDL		
SAL-26	2.47E+03	2.49E+03	2.0%	4.52E+01	5.16E+01	25%
SAL-26D	2.52E+03			5.81E+01		
SAL-30	5.52E+02	5.47E+02	1.5%	<MDL	<MDL	NA
SAL-30D	5.43E+02			<MDL		
SES-04	1.76E+04	1.82E+04	6.8%	1.88E+02	1.89E+02	0.2%
SES-04D	1.89E+04			1.89E+02		
SES-07	6.16E+02	5.77E+02	13%	<MDL	<MDL	NA
SES-07D	5.39E+02			<MDL		
SES-10	3.20E+03	3.16E+03	2.7%	<MDL	<MDL	NA
SES-10D	3.11E+03			<MDL		
SES-14	1.84E+03	1.85E+03	0.5%	<MDL	<MDL	NA
SES-14D	1.85E+03			<MDL		

Table 5. Methyl Bromide and 1,3-Dichloropropene Canister Collocated Results

Sample I.D.	Methyl Bromide			Total 1,3-Dichloropropene		
	(ng/m3)	Average	Rel. Diff.	(ng/m3)	Average	Rel. Diff.
SES-17	3.73E+03	3.93E+03	10%	<MDL	<MDL	NA
SES-17D	4.14E+03			<MDL		
SES-20	**	NA	NA	**	NA	NA
SES-20D	1.27E+04			<MDL		
SES-26	8.18E+03	8.41E+03	5.6%	<MDL	<MDL	NA
SES-26D	8.65E+03			<MDL		
SES-30	6.20E+02	6.26E+02	1.9%	<MDL	<MDL	NA
SES-30D	6.32E+02			<MDL		
AVE=			7.9%	AVE= 12%		

Table 6. MeBr and 1,3-Dichloropropene Canister Lab Spike Results

Sample Date	Methyl Bromide			cis-1,3-Dichloropropene			trans-1,3-Dichloropropene		
	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery
09/11/00	279	294	105%	307	288	94%	307	273	89%
09/26/00	283	300	106%	312	314	101%	312	297	95%
10/19/00	272	265	97%	300	262	87%	300	280	93%
11/02/00	273	263	96%	301	242	80%	301	253	84%
	Ave.=		101%	Ave.=		91%	Ave.=		90%

Table 7. MeBr and 1,3-Dichloropropene Canister Trip Spike Results

Sample Date	Methyl Bromide			cis-1,3-Dichloropropene			trans-1,3-Dichloropropene		
	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery	Expected (ng/m3)	Actual (ng/m3)	Percent Recovery
09/11/00	272	286	105%	300	316	105%	300	299	100%
09/26/00	268	286	107%	295	295	100%	295	313	106%
10/19/00	270	237	88%	298	167	56%	298	163	55%
11/02/00	277	293	106%	306	283	92%	306	271	89%
	Ave.=		101%	Ave.=		88%	Ave.=		87%

The "Expected" lab and trip spike concentrations = amount spiked/final lab volume.

The "Actual" concentration = the concentration result for the lab or trip spike sample.

Table 8. MeBr and 1,3-Dichloropropene Canister Field Spike Results

Sample Date	Methyl Bromide				
	Expected (ng/m3)	Actual (ng/m3)	*Collocated Amount (ng/m3)	Corrected Actual (ng/m3)	Percent Recovery
09/11/00	548	7991	7670	321	59%
09/26/00	512	1565	1010	555	108%
10/19/00	483	7476	8230	-754	-156%
11/02/00	537	1198	749	449	84%
Ave.=					24%

Sample Date	cis-1,3-Dichloropropene				
	Expected (ng/m3)	Actual (ng/m3)	*Collocated Amount (ng/m3)	Corrected Actual (ng/m3)	Percent Recovery
09/11/00	604	840	91	749	124%
09/26/00	567	658	<MDL	658	116%
10/19/00	533	388	Det (25)	380	71%
11/02/00	593	665	Det (25)	626	106%
Ave.=					104%

Sample Date	trans-1,3-Dichloropropene				
	Expected (ng/m3)	Actual (ng/m3)	*Collocated Amount (ng/m3)	Corrected Actual (ng/m3)	Percent Recovery
09/11/00	604	830	Det (36)	794	131%
09/26/00	567	703	<MDL	703	124%
10/19/00	533	405	60	345	65%
11/02/00	593	651	<MDL	651	110%
Ave.=					107%

The "Expected" field spike concentrations = amount spiked/field sampling volume.

The "Actual" concentration = the concentration result for the field spike sample.

*Concentration in the collocated ambient sample taken at the SAL sampling site.

Table 9. 1,3-Dichloropropene Charcoal Tube Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (hours)	Volume (m3)	1,3-Dichloropropene				
						cis ng/sample	trans ng/sample	total (ng/sample)	(ng/m3)	*pptv
3	SAL-T1	9/11/00 08:15	9/12/00 08:11	23.9	4.3	5.63E+02	2.95E+02	8.58E+2	2.0E+02	4.39E+01
4	OAS-T1	9/11/00 09:45	9/12/00 09:10	23.4	4.2	8.27E+02	5.35E+02	1.36E+3	3.2E+02	7.12E+01
5	CHU-T1	9/11/00 10:40	9/12/00 10:02	23.4	4.2	4.05E+03	2.13E+03	6.18E+3	1.5E+03	3.24E+02
6	LJE-T1	9/11/00 11:20	9/12/00 10:38	23.3	4.2	2.65E+02	1.31E+02	3.96E+2	9.4E+01	2.08E+01
7	PMS-T1	9/11/00 12:17	9/12/00 11:19	23.0	4.1	9.07E+02	5.79E+02	1.49E+3	3.6E+02	7.90E+01
8	SES-T1	9/11/00 12:55	9/12/00 11:55	23.0	4.1	2.82E+02	2.07E+02	4.89E+2	1.2E+02	2.60E+01
9	OAS-T2	9/12/00 09:11	9/13/00 09:30	24.3	4.4	1.59E+03	9.23E+02	2.51E+3	5.7E+02	1.26E+02
10	CHU-T2	9/12/00 10:03	9/13/00 10:23	24.3	4.4	1.01E+04	5.45E+03	1.56E+4	3.6E+03	7.82E+02
11	LJE-T2	9/12/00 10:39	9/13/00 11:05	24.4	4.4	5.56E+02	2.99E+02	8.55E+2	1.9E+02	4.28E+01
12	PMS-T2	9/12/00 11:21	9/13/00 11:50	24.5	4.4	9.64E+02	6.69E+02	1.63E+3	3.7E+02	8.16E+01
13	SES-T2	9/12/00 11:56	9/13/00 12:30	24.6	4.4	5.32E+02	3.59E+02	8.91E+2	2.0E+02	4.44E+01
14	SAL-T3	9/13/00 08:05	9/14/00 08:05	24.0	4.3	1.62E+02	7.61E+01	2.38E+2	5.5E+01	1.21E+01
15	SAL-T3D	9/13/00 08:05	9/14/00 08:05	24.0	4.3	1.57E+02	7.42E+01	2.31E+2	5.4E+01	1.18E+01
16	OAS-T3	9/13/00 09:40	9/14/00 09:25	23.7	4.3	2.39E+03	1.20E+03	3.59E+3	8.4E+02	1.85E+02
17	OAS-T3D	9/13/00 09:40	9/14/00 09:25	23.7	4.3	2.00E+03	1.00E+03	3.00E+3	7.0E+02	1.55E+02
18	CHU-T3	9/13/00 10:35	9/14/00 10:25	23.8	4.3	2.58E+03	2.31E+03	4.89E+3	1.1E+03	2.51E+02
19	CHU-T3D	9/13/00 10:35	9/14/00 10:30	23.9	4.3	2.83E+03	2.56E+03	5.39E+3	1.3E+03	2.76E+02
20	LJE-T3	9/13/00 11:05	9/14/00 11:50	24.8	4.5	4.40E+01	3.04E+01	7.44E+1	1.7E+01	3.68E+00
21	LJE-T3D	9/13/00 11:05	9/14/00 11:50	24.8	4.5	4.55E+01	3.15E+01	7.70E+1	1.7E+01	3.81E+00
22	PMS-T3	9/13/00 11:55	9/14/00 12:35	24.7	4.4	3.88E+01	3.24E+01	7.12E+1	1.6E+01	3.53E+00
23	PMS-T3D	9/13/00 11:55	9/14/00 12:40	24.8	4.5	3.94E+01	3.23E+01	7.17E+1	1.6E+01	3.55E+00
24	SES-T3	9/13/00 12:35	9/14/00 13:10	24.6	4.4	9.14E+01	7.21E+01	1.64E+2	3.7E+01	8.14E+00
25	SES-T3D	9/13/00 12:35	9/14/00 13:15	24.7	4.4	9.06E+01	7.15E+01	1.62E+2	3.7E+01	8.04E+00
26	SAL-T4	9/14/00 08:15	9/15/00 08:00	23.8	4.3	<MDL	<MDL	<MDL	<MDL	<MDL
27	OAS-T4	9/14/00 08:45	9/15/00 09:00	24.2	4.4	8.95E+01	5.59E+02	6.49E+2	1.5E+02	3.27E+01
28	CHU-T4	9/14/00 09:30	9/15/00 09:50	24.3	4.4	9.81E+00	8.76E+00	1.86E+1	4.2E+00	9.34E-01
29	LJE-T4	9/14/00 11:55	9/15/00 11:00	23.1	4.2	1.04E+01	8.76E+00	1.92E+1	4.6E+00	1.02E+00
30	PMS-T4	9/14/00 12:45	SP	SP	SP	SP	SP	SP	SP	SP
31	SEST4	9/14/00 13:20	Counter (1)	23.1	4.2	5.74E+02	4.64E+02	1.04E+3	2.5E+02	5.50E+01

SP = Sampling Problem

MDL = 4.8 ng/sample for cis 1,3-DCP
MDL = 5.5 ng/sample for trans-DCP

1. Sample time from counter values
*pptv at 1 atm and 25 C

Table 10. Summary of 1,3-Dichloropropene Charcoal Tube Monitoring Results (ng/m3)

Start Date/Time	CHU	LJE	OAS	PMS	SAL	SES
09/11/00	1.5E+03	9.4E+01	3.2E+02	3.6E+02	2.0E+02	1.2E+02
09/12/00	3.6E+03	1.9E+02	5.7E+02	3.7E+02	no sample	2.0E+02
09/13/00	1.1E+03	1.7E+01	8.4E+02	1.6E+01	5.5E+01	3.7E+01
09/13/00	1.3E+03	1.7E+01	7.0E+02	1.6E+01	5.4E+01	3.7E+01
09/14/00	4.2E+00	4.6E+00	1.5E+02	NA	<MDL	2.5E+02

Maximum	3600	190	840	370	200	250
Average	1500	65	520	190	100	130
# Samples	4	4	4	3	3	4
# >EQL	4	4	4	3	2	4
# Det	0	0	0	0	0	0
# <MDL	0	0	0	0	1	0

Only the higher value of each collocated pair is used in the above statistics.

<MDL results were factored into the average as MDL/2 = 10 ng/m3.

Table 11. 1,3-Dichloropropene (total) Charcoal Tube Collocated Results

Log #	Sample ID	(ng/m3)	Average	Relative Difference
18	CHU-T3	1.1E+03	1.2E+03	17%
19	CHU-T3D	1.3E+03		
20	LJE-T3	1.7E+01	1.7E+01	0.0%
21	LJE-T3D	1.7E+01		
16	OAS-T3	8.4E+02	7.7E+02	18%
17	OAS-T3D	7.0E+02		
22	PMS-T3	1.6E+01	1.6E+01	0.0%
23	PMS-T3D	1.6E+01		
14	SAL-T3	5.5E+01	5.5E+01	1.8%
15	SAL-T3D	5.4E+01		
24	SES-T3	3.7E+01	3.7E+01	0.0%
25	SES-T3D	3.7E+01		
			AVE=	6.1%

Table 12. 1,3-Dichloropropene Charcoal Tube Lab Spike Results

Sample I.D.	cis-1,3-Dichloropropene			trans-1,3-Dichloropropene		
	Expected (ng)	Actual (ng)	Percent Recovery	Expected (ng)	Actual (ng)	Percent Recovery
LS-1	28.8	26.5	92%	29.4	27.1	92%
LS-2	28.8	25.7	89%	29.4	25.2	86%
	Ave.=		91%	Ave.=		89%

Table 13. 1,3-Dichloropropene Charcoal Tube Trip Spike Results

Sample I.D.	cis-1,3-Dichloropropene			trans-1,3-Dichloropropene		
	Expected (ng)	Actual (ng)	Percent Recovery	Expected (ng)	Actual (ng)	Percent Recovery
TS-1	28.8	28.0	97%	29.4	28.7	98%
TS-2	28.8	24.2	84%	29.4	24.1	82%
	Ave.=		91%	Ave.=		90%

Table 14. 1,3-Dichloropropene Charcoal Tube Field Spike Results

Sample I.D.	cis-1,3-Dichloropropene				
	Expected (ng)	Actual (ng)	*Collocated Amount (ng)	Corrected Actual (ng)	Percent Recovery
FS-1	28.8	618	563	55	191%
FS-2	28.8	627	563	64	222%
	Ave.=				207%

Sample I.D.	trans-1,3-Dichloropropene				
	Expected (ng)	Actual (ng)	*Collocated Amount (ng)	Corrected Actual (ng)	Percent Recovery
FS-1	29.4	339	295.0	44	150%
FS-2	29.4	345	295.0	50	170%
	Ave.=				160%

*Amount in the collocated ambient sample taken at the SAL sampling site.

Table 15. 1,3-Dichloropropene Charcoal Tube and Canister Results Comparison (ng/m3)

Sample Start Date	Site CHU			Site LJE			Site OAS		
	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)
09/11/00	1.5E+03	2.28E+03	1.6	9.4E+01	<MDL	NA	3.2E+02	2.80E+02	0.9
09/12/00	3.6E+03	4.34E+03	1.2	1.9E+02	<MDL	NA	5.7E+02	6.41E+02	1.1
09/13/00	1.2E+03	1.59E+03	1.3	1.7E+01	5.65E+02	33.8	7.7E+02	1.14E+03	1.5
09/14/00	4.2E+00	<MDL	NA	4.6E+00	<MDL	NA	1.5E+02	3.64E+02	2.5
	Ave Ratio =		1.4	Ave Ratio =		33.8	Ave Ratio =		1.5

Sample Start Date	Site PMS			Site SAL			Site SES		
	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)
09/11/00	3.6E+02	3.11E+02	0.9	2.0E+02	9.10E+01	0.5	1.2E+02	<MDL	NA
09/12/00	3.7E+02	2.59E+02	0.7	no sample	<MDL	NA	2.0E+02	<MDL	NA
09/13/00	1.6E+01	Det	NA	5.5E+01	<MDL	NA	3.7E+01	**	NA
09/14/00	NA	5.22E+02	NA	<MDL	<MDL	NA	2.5E+02	1.89E+02	0.8
	Ave Ratio =		0.8	Ave Ratio =		0.5	Ave Ratio =		0.8

Collocated results are listed as averages.

(1) Ratio = canister result/charcoal tube result

NA = Not Applicable

**Flow rate deviation >25%.

Table 16. Methyl Bromide Charcoal Tube Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Methyl Bromide		
							(ng/sample)	(ng/m3)	*pptv
1	SAL-1	9/25/00 10:00	9/26/00 09:25	1405	23.4	4.2	**	**	**
4	OAS-1	9/25/00 11:16	9/26/00 10:45	1409	23.5	4.2	ND	ND	ND
5	CHU-1	9/25/00 12:00	9/26/00 11:35	1415	23.6	4.2	**	**	**
6	LJE-1	9/25/00 12:30	9/26/00 12:20	1430	23.8	4.3	**	**	**
7	PMS-1	9/25/00 13:15	9/26/00 13:10	1435	23.9	4.3	"Uncertain"	"Uncertain"	"Uncertain"
8	SES-1	9/25/00 13:45	9/26/00 13:45	1440	24.0	4.3	ND	ND	ND
9	SAL-2	9/26/00 09:45	9/27/00 09:00	1395	23.3	4.2	**	**	**
12	OAS-2	9/26/00 10:50	9/27/00 10:20	1410	23.5	4.2	**	**	**
13	OAS-2D	9/26/00 11:00	9/27/00 10:20	1400	23.3	4.2	**	**	**
14	CHU-2	9/26/00 11:45	9/27/00 11:12	1407	23.4	4.2	ND	ND	ND
15	CHU-2D	9/26/00 11:50	9/27/00 11:19	1409	23.5	4.2	ND	ND	ND
16	LJE-2	9/26/00 12:15	9/27/00 12:30	1455	24.3	4.4	"Uncertain"	"Uncertain"	"Uncertain"
17	LJE-2D	9/26/00 12:30	9/27/00 12:35	1445	24.1	4.3	"Uncertain"	"Uncertain"	"Uncertain"
18	PMS-2	9/26/00 13:15	9/27/00 13:15	1440	24.0	4.3	**	**	**
19	PMS-2D	9/26/00 13:20	9/27/00 13:20	1440	24.0	4.3	**	**	**
20	SES-2	9/26/00 13:50	9/27/00 13:55	1445	24.1	4.3	ND	ND	ND
21	SES-2D	9/26/00 13:55	9/27/00 13:55	1440	24.0	4.3	ND	ND	ND
22	SAL-3	9/27/00 09:15	9/28/00 08:45	1410	23.5	4.2	ND	ND	ND
23	SAL-3D	9/27/00 09:20	9/28/00 08:50	1410	23.5	4.2	ND	ND	ND
24	OAS-3	9/27/00 10:30	9/28/00 10:05	1415	23.6	4.2	ND	ND	ND
25	CHU-3	9/27/00 11:22	9/28/00 11:15	1433	23.9	4.3	**	**	**
26	LJE-3	9/27/00 12:45	9/28/00 12:15	1410	23.5	4.2	"Uncertain"	"Uncertain"	"Uncertain"
27	PMS-3	9/27/00 13:25	9/28/00 13:07	1422	23.7	4.3	"Uncertain"	"Uncertain"	"Uncertain"
28	SES-3	9/27/00 14:00	9/28/00 14:05	1445	24.1	4.3	ND	ND	ND
29	SAL-4	9/28/00 08:55	9/29/00 08:25	1410	23.5	4.2	ND	ND	ND

ND = Not Detected (less than reporting limit of 0.2 ug/sample)

= 28 ug/m3 for a 24 hour sample at 5 sccpm

"Uncertain" = (See footnote to Table 17)

** = flow rate deviation >20%; not submitted to laboratory

Table 16. Methyl Bromide Charcoal Tube Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Methyl Bromide		
							(ng/sample)	(ng/m3)	*pptv
30	OAS-4	9/28/00 10:17	9/29/00 09:40	1403	23.4	4.2	**	**	**
31	CHU-4	9/28/00 11:15	9/29/00 10:45	1410	23.5	4.2	ND	ND	ND
32	LJE-4	9/28/00 00:16	9/29/00 11:50	2134	35.6	6.4	"Uncertain"	"Uncertain"	"Uncertain"
33	PMS-4	9/28/00 13:10	9/29/00 12:40	1410	23.5	4.2	"Uncertain"	"Uncertain"	"Uncertain"
34	SES-4	9/28/00 13:50	9/29/00 13:10	1400	23.3	4.2	ND	ND	ND

ND = Not Detected (less than reporting limit of 0.2 ug/sample)
 = 28 ug/m3 for a 24 hour sample at 5 sccpm

"Uncertain" = (See footnote to Table 17)

** = flow rate deviation >20%; not submitted to laboratory

Table 17. Summary of Methyl Bromide Charcoal Tube Monitoring Results

Start Date/Time	CHU	LJE	OAS	PMS	SAL	SES
09/25/00	**	**	ND	"Uncertain"	**	ND
09/26/00	ND	"Uncertain"	**	**	**	ND
09/26/00	ND	"Uncertain"	**	**	ND	ND
09/27/00	**	"Uncertain"	ND	"Uncertain"	ND	ND
09/28/00	ND	"Uncertain"	**	"Uncertain"	ND	ND

"Uncertain": The CDFA laboratory report contained the following "remarks:"

"In the past all sample tubes were labeled individually. This time one of our student assistants did not realize the charcoal tubes were not labeled. She took out all the samples assigned to her from labeled packages. So, the identities of this sample set were lost. The sample log #s in this set are 16, 17, 26, 32, 7, 27, 33. However, I analyzed all of them and found 0.2 ug methyl bromide in one A-tube, trace amount in two A-tubes, none detected in 4 A-tubes and none detected in all 7 B-tubes." ("A" and "B" tubes referred to the front and back sections of charcoal sampling cartridges, respectively.)

Table 18. Methyl Bromide Charcoal Tube and Canister Results Comparison (ng/m3)

Sample Start Date	Site CHU			Site LJE			Site OAS		
	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)
09/25/00	**	4.66E+02	-	**	1.17E+03	-	ND	**	-
09/26/00	ND	1.25E+03	-	"Uncertain"	2.31E+03	-	**	6.04E+02	-
09/27/00	**	8.92E+02	-	"Uncertain"	1.04E+03	-	ND	9.66E+02	-
09/28/00	ND	2.62E+03	-	"Uncertain"	1.44E+04	-	**	6.26E+02	-

Sample Start Date	Site PMS			Site SAL			Site SES		
	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)	Tube	Can	Ratio (1)
09/25/00	"Uncertain"	4.83E+03	-	**	5.72E+02	-	ND	4.72E+03	-
09/26/00	**	1.38E+04	-	ND	1.01E+03	-	ND	3.20E+03	-
09/27/00	"Uncertain"	5.16E+04	-	ND	2.94E+02	-	ND	6.56E+03	-
09/28/00	"Uncertain"	8.33E+04	-	ND	1.00E+04	-	ND	1.60E+04	-

Collocated results are listed as averages.

(1) Ratio = canister result/charcoal tube result.

ND = Not Detected

"Uncertain": (See footnote in Table 17)

**Flow rate deviation >20%, sample not submitted to laboratory.

Table 19. MeBr Charcoal Tube Trip Spike Results

Sample I.D.	Expected (ug)	Actual (ug)	Percent Recovery
TS-1	1.6	0.91	57%
TS-2	1.6	0.92	58%
TS-3	1.6	0.94	59%
TS-4	1.6	0.90	56%
Ave.=			57%

Table 20. MeBr Charcoal Tube Field Spike Results

Sample I.D.	Expected (ug)	Actual (ug)	*Collocated Amount (ug)	Corrected Actual (ug)	Percent Recovery
FS-1	1.6	**	**	-	-
FS-2	1.6	**	**	-	-
FS-3	1.6	0.97	**	0.97	61%
FS-4	1.6	0.87	**	0.87	54%
Ave.=					58%

**Flow rate deviation >20%, sample not submitted to laboratory.

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Ambient Air Monitoring for
Methyl Bromide and 1,3-Dichloropropene
in Monterey/Santa Cruz Counties – Fall 2000

Engineering and Certification Branch

Monitoring and Laboratory Division

Project No. C00-028

Date: January 31, 2001

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APPENDIX I
MONITORING PROTOCOL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

**Protocol for the Ambient Air Monitoring
for Methyl Bromide and Telone
In Kern, Monterey and Santa Cruz Counties
During Summer/Fall, 2000**

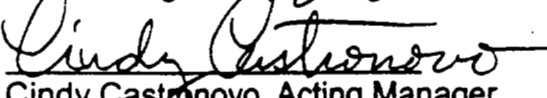
Engineering and Certification Branch
Monitoring and Laboratory Division

Project No.
C00-028

Date: August 4, 2000

APPROVED:


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Testing Section


George Lew, Chief
Engineering and Certification Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

**Protocol for the Ambient Air Monitoring
for Methyl Bromide and Telone
In Kern, Monterey and Santa Cruz Counties
During Summer/Fall, 2000**

I. Introduction

At the request (November 1, 1999 Memorandum, Helliker to Lloyd and June 16, 2000 Memorandum, Sanders to Lew) of the California Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticides methyl bromide and Telone in Kern County over an eight week ambient monitoring period, tentatively scheduled from July 10, 2000 to September 1, 2000. Airborne concentrations of the pesticides methyl bromide and Telone will also be determined in Monterey and Santa Cruz Counties over an eight week ambient monitoring period, tentatively scheduled from September 11, 2000 to November 3, 2000. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions...of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. Monitoring is being conducted to coincide with the use of methyl bromide and Telone as fumigants on carrots, sweet potatoes, wine grapes and strawberries.

The sampling and analysis for methyl bromide will follow the procedures outlined in this protocol as well as the quality assurance guidelines described in the "Quality Assurance Plan for Pesticide Air Monitoring" (May 11, 1999 version)(Attachment I).

The draft method development results and Standard Operating Procedures for the analysis of methyl bromide and Telone in canisters are included as Attachment II.

The California Department of Food and Agriculture (CDFA) method, "Determination of Methyl Bromide Desorbed from Charcoal Tubes", is included as Attachment III.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of 1,3 dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector (07/10/00 Version)", is enclosed as Attachment IV.

II. Sampling

The primary procedure used for the fumigant monitoring will involve canister sampling. However, charcoal adsorbent tube samples will also be collected on a limited basis for the purpose of comparing methods. Charcoal tube samples for Telone will be collocated with the canister samples for approximately 1 week of sampling in Kern County and charcoal tube samples for methyl bromide will be collocated with the

canister samples for approximately 1 week in Monterey-Santa Cruz Counties. 24-hour samples will be taken Monday through Friday (4 sample periods/week).

Charcoal Tubes:

The sampling method requires passing measured quantities of ambient air through charcoal tubes. For Telone, the tubes are 8 mm x 110 mm, coconut-base charcoal with 400 mg in the primary section, and 200 mg in the secondary (SKC catalogue #226-09). For methyl bromide, the tubes are 8 mm x 110 mm, petroleum-base charcoal with 400 mg in the primary section, and 200 mg in the secondary (SKC catalogue #226-38-02). Sample collection for Telone is for 24 hours at a flow rate of 3 standard Lpm. Sample collection for methyl bromide is for 24 hours at 5 standard cubic centimeters per minute (sccpm). Subsequent to sampling, the tubes are capped, labeled, placed in a culture tube and stored and transported in an insulated container with dry ice. The samples are transported to the ARB laboratory in Sacramento. DPR recommends target 24-hour estimated quantitation limits (EQLs) of 0.4 ug/m³ and 0.01 ug/m³ for methyl bromide and Telone respectively. The charcoal tube method for Telone has EQLs of approximately 0.005 ug/m³ for both cis and trans 1,3-dichloropropene. The CDFA charcoal tube method for methyl bromide has a "minimum detectable level" of approximately 0.2 ug/m³.

Referring to Figure 1, each sample train consists of a charcoal tube, Teflon fittings and tubing, rain/sun shield, rotameter, train support and a 115 volt AC vacuum pump. Each tube is prepared for use by breaking off each sealed glass end and then immediately inserting the tube into the Teflon fitting. The tubes are oriented in the sample train according to a small arrow printed on the side of each tube indicating the direction of flow. A 0-5 Lpm rotameter is used to control sample flow for the Telone sampling and a 0-50 sccpm rotameter will be used for the methyl bromide sampling. The methyl bromide sampling tree will also include a flow bypass line to allow a greater volume of flow (e.g., 5 Lpm) through the pump to avoid damage to the pump. This flow bypass line will be regulated with a 0-5 Lpm rotameter. The flow rates will be set using a calibrated digital mass flow meter (MFM) before the start of each sampling period. A MFM scaled from 0-5 standard Lpm is used for Telone and a 0-10 standard cccpm MFM is used for the methyl bromide samplers. The flow rate is also checked and recorded, using the MFM, at the end of each sampling period. Samplers will be leak checked prior to each sampling period with the sampling tubes installed. Any change in flow rates will be recorded in the field logbook.

Canisters: Methyl Bromide (MeBr) and Telone

Integrated ambient air samples will be collected using passive air sampling into evacuated 6 liter, Silcosteel canisters (from Restec Corporation). The flow rate of 3 sccpm will be accurately set and measured and the sampling system operated continuously for 24 hours with the exact operating interval recorded in the log-book

and on the field data sheets (see Attachment V). The canister vacuum reading will be recorded at the start and end of each sampling period using the -30 to 0 inHg gauge on the passive sampler. The start and end canister vacuum readings will be approximately -30 inHg and -8 inHg respectively. The canister vacuum reading will also be measured using a more accurate gauge in the lab before and after transport to/from the field. The laboratory gauge before and after vacuum readings will be used to calculate the sample volume collected. The 3 sccm sampling rate will yield a sample volume of 4.32 liters over the 24 hour sampling period. The EQL for MeBr is 0.04 ug/m³ (target EQL was 0.4 ug/m³) and the EQLs for cis and trans 1,3-dichloropropene are 0.04 and 0.06 ug/m³ respectively (target EQL for Telone was 0.01 ug/m³).

Referring to Figure 2, the critical orifice flow controllers (Silcosteel treated Veriflo SC423XL) will be attached, using a Silcosteel treated swagelock connector, to the valve fitting on the canister. A 6 foot section of 1/8 inch O.D. Silcosteel tubing is attached to the inlet end of an in-line, 5 micron filter, which is attached to the inlet end of the flow controller. The inlet end of the tubing is bent into a U shape (to prevent rain from entering) and supported about 6 feet above the building roof tops for the ambient monitoring. At the end of each sampling period, the canisters will be placed in shipping containers, with a sample identification/chain of custody sheet, and will be shipped, by UPS, as soon as reasonably possible to the ARB Monitoring and Laboratory Division laboratory for analysis. The samples will be stored at ambient laboratory temperature prior to analysis.

When using a critical orifice flow restrictor for passive integrated sampling, the potential decrease in flow rate as the vacuum in the canister changes must be taken into account. This condition is resolved by using the Veriflo SC423XL flow controller. This flow device incorporates a metal diaphragm downstream of the critical orifice to regulate the flow as the pressures the canister changes. This controller is capable of maintaining a continuous low flow with vacuum ranges from -29.9 to -5 inHg. The in-line filter prevents particles from entering the critical orifice of the flow controller, which could clog the critical orifice and affect the flow through the controller. However, the outside temperature can affect the flow rate. For example, there could be an approximately 6% flow drop when the temperature changes from 80 °F to 125 °F (according to manufacturer's specifications).

The canister sampling field log sheet and canister data sheet are enclosed as Attachment V. These forms will be used to record start and stop times, start and stop vacuum readings, sample identifications, weather conditions, sampler's initials and any other significant data.

Ambient Monitoring

The use patterns for methyl bromide and Telone suggest that monitoring should occur in Kern County during the months of July and August. Five sampling sites will be

selected in relatively high-population areas or in areas frequented by people. At each site, a target of 32 discrete 24-hour samples will be taken during the sampling period. Background samples will be collected in an urban area in Bakersfield (the ARB air monitoring station). Replicate (collocated) samples will be collected for 1 day/week (each Wednesday) at each sampling location.

The use patterns for methyl bromide and Telone suggest that monitoring should occur in Monterey and Santa Cruz Counties during the months of September and October. Five sampling sites will be selected in relatively high-population areas or in areas frequented by people. At each site, a target of 32 discrete 24-hour samples will be taken during the sampling period. Background samples will be collected in an urban area in Monterey. Replicate (collocated) samples will be collected for eight dates (each Wednesday) at each sampling location.

The sites will be selected by ARB personnel from the areas of Kern County where carrot and rose farming is predominant and from areas of Monterey and Santa Cruz Counties where strawberry farming is predominant. Sites will be selected for their proximity to the fields with considerations for both accessibility and security of the sampling equipment. The sites are near areas of historical use of methyl bromide and Telone. ARB understands that DPR staff will verify and quantify the actual use of methyl bromide and Telone that takes place during the study when the information becomes available.

III. Analysis

The method development results and standard operating procedures for the sampling and analysis of methyl bromide and Telone in canisters are included as Attachment II. The procedures are based on EPA Method TO-15 and consist of cryogenic pre-concentration of an aliquot of the whole air sample followed by GC/MS analysis. The canisters arrive from the field at sub-ambient pressure and are pressurized (diluted) in the laboratory before analysis. The analyses will be performed by the ARB laboratory in Sacramento.

The CDFA method, "Determination of Methyl Bromide Desorbed from Charcoal Tubes", is enclosed as Attachment III. Methyl bromide in the air that has been absorbed onto activated charcoal is desorbed from the charcoal with ethyl acetate. Subsequently, MeBr is quantified using a gas chromatograph equipped with a HP-5 megabore capillary column and an electron capture detector (ECD). The analyses will be performed by the CDFA laboratory in Sacramento.

The ARB method, "Standard Operating Procedure, Sampling and Analysis of 1,3 dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector (07/10/00 Version)," is enclosed as Attachment IV. The exposed charcoal

tubes are stored in an ice chest or refrigerator until desorbed with 3 ml of dichloromethane. The attached SOP specifies that a gas chromatograph with a mass selective detector is used for analysis. The analyses will be performed by the ARB laboratory in Sacramento.

IV. Quality Assurance

Field Quality Control for the ambient monitoring will include (for canisters and charcoal tubes):

- 1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air at the background monitoring site for 24 hour periods at 3 sccpm (i.e., collocated with a background sample). The four field spikes will all be collected on the same day (i.e., as replicates).
- 2) Four trip spikes prepared at the same level as the field spikes. The 4 trip spikes will all be transported along with the field spikes (i.e., as replicates).
- 3) Four lab spikes prepared at the same level as the field and trip spikes.
- 4) Collocated samples will be taken for eight dates (for the canister samples) at each sampling location. Collocated samples will be taken for one date for the charcoal tube samples.
- 5) A trip blank will be obtained each week of sampling.

VII. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer) and Neil Adler (Instrument Technician) from the Testing Section and staff from the Air Quality Surveillance Branch of ARB.

FIGURE 1. SAMPLE TREE

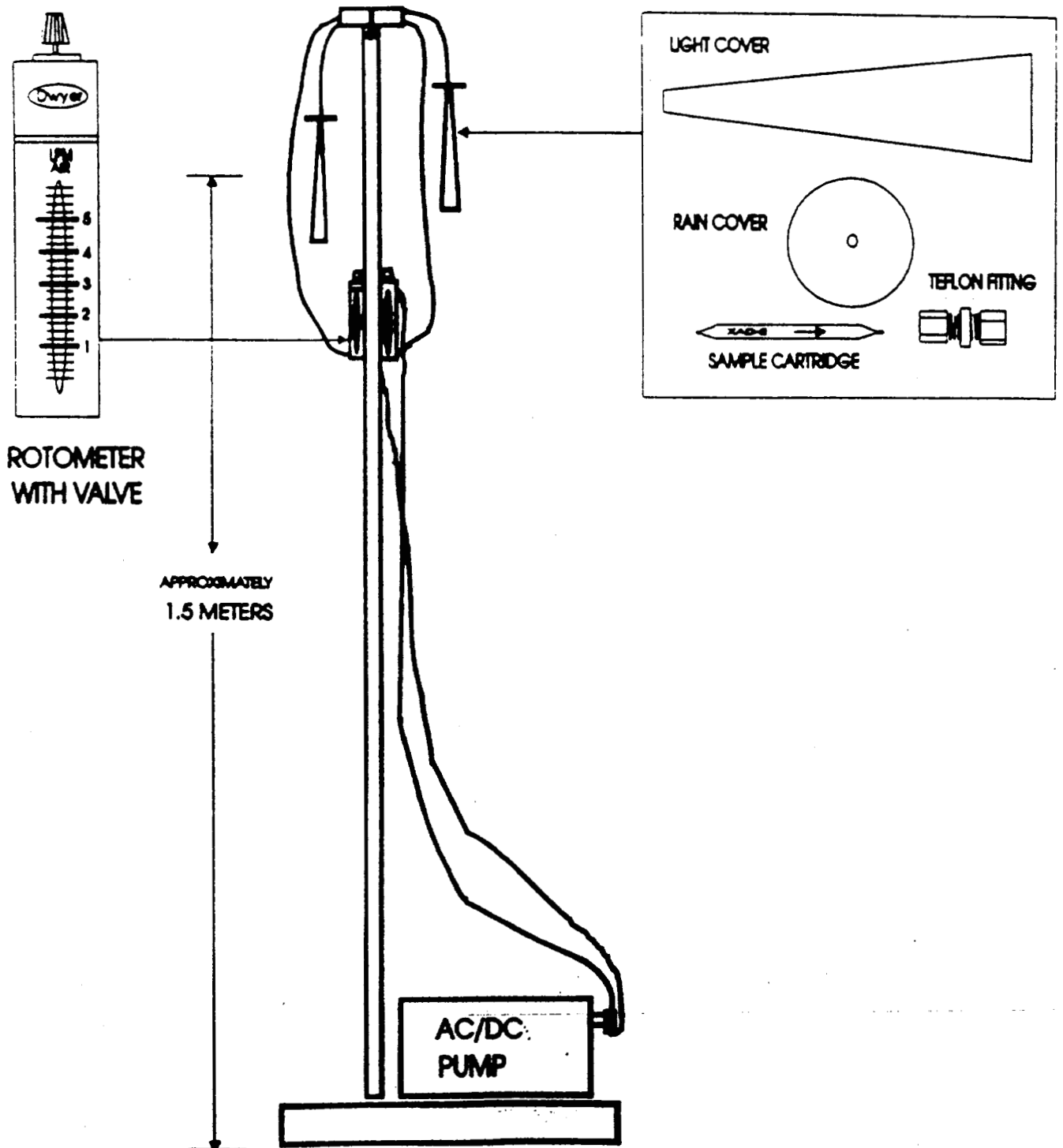
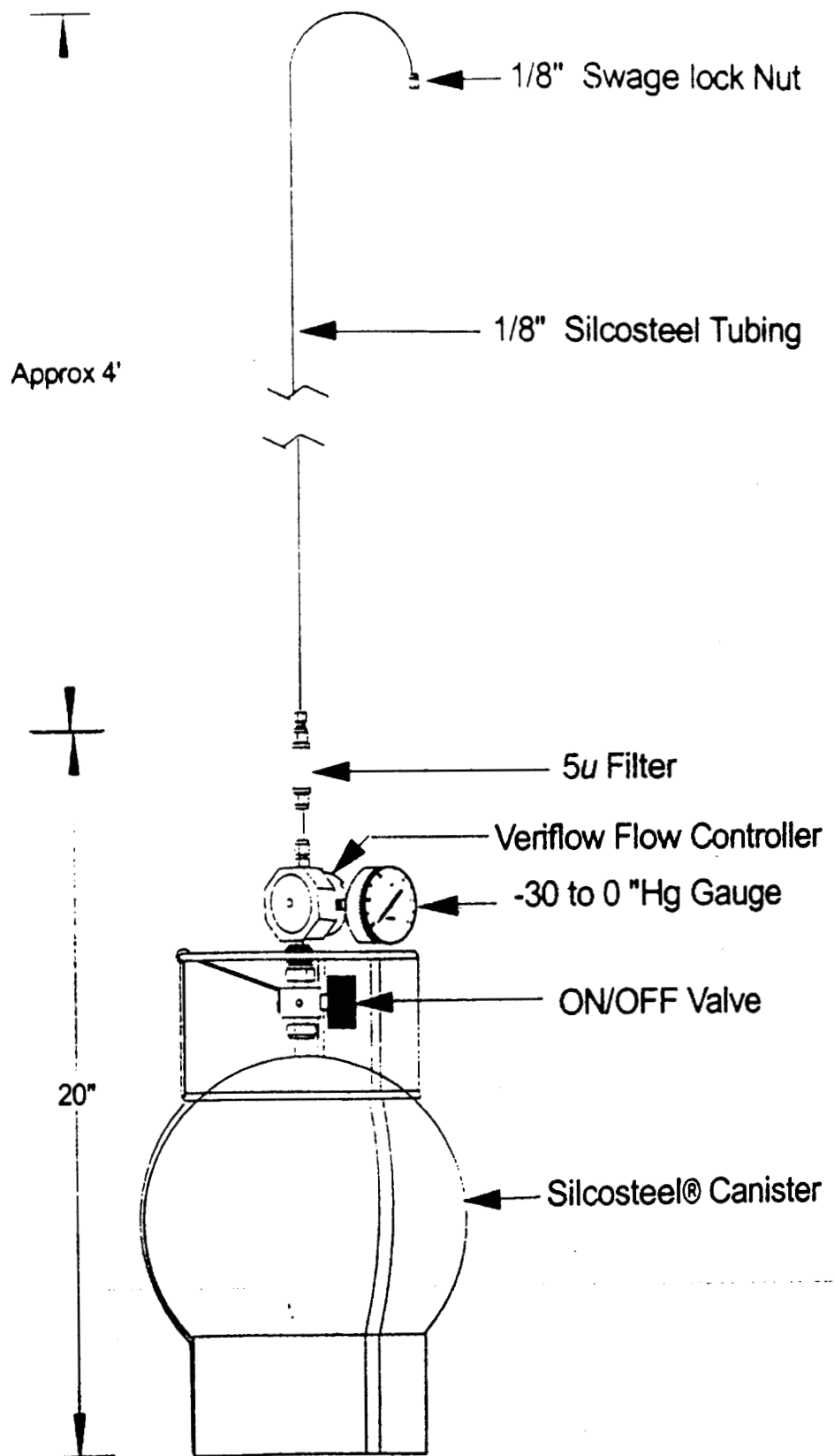


Figure 2
Passive Canister Sampling Train



Attachment I

Quality Assurance Plan for Pesticide Air Monitoring

State of California
California Environmental Protection Agency
Air Resources Board

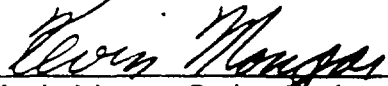
QUALITY ASSURANCE PLAN
FOR PESTICIDE AIR MONITORING

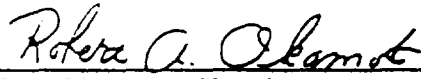
Prepared by the

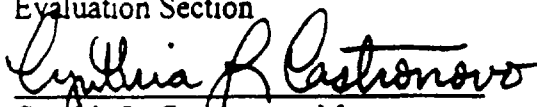
Monitoring and Laboratory Division
Engineering and Laboratory Branch


Revised: May 11, 1999

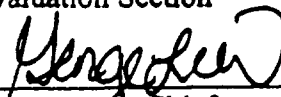
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This Quality Assurance Plan has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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QUALITY ASSURANCE PLAN FOR PESTICIDE MONITORING

I. Introduction

At the request of the Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) staff determines the airborne concentrations of specified pesticides following monitoring recommendations established by the DPR. This air monitoring is conducted to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The documentation of airborne concentrations is usually accomplished through two types of monitoring. The first consists of five to eight weeks of **ambient** monitoring in the general area of, and during the season of, **peak** use of the specified pesticide. The second is monitoring around the perimeter of a field during and for 72 hours after an **application** has occurred. These are referred to as ambient and application monitoring, respectively. To help clarify the differences between these two monitoring programs, ambient and application are highlighted in bold in this document when the information applies specifically to either program. The purpose of this document is to specify quality assurance activities for the sampling and laboratory analysis of the monitored pesticide.

A. Quality Assurance Policy Statement

It is the policy of the ARB to provide DPR with accurate, relevant and timely air monitoring measurements of airborne pesticide concentrations. The goal of this document is to identify procedures that ensure the implementation of this policy.

B. Quality Assurance Objectives

Quality assurance objectives for pesticide monitoring are as follows.

- (1) to establish the necessary quality control activities relating to site selection, method validation, analytical standard operating procedures (SOP), sample collection, sampling and analysis protocol, data reduction and final reports, and;
- (2) to assess data quality in terms of precision, accuracy and completeness, and;
- (3) to design air monitoring strategies to meet the pesticide target (estimated) quantitation levels as provided by the DPR.

II. Air Monitoring

All sampling will be coordinated through communication with the County Agricultural Commissioner's Office. The local Air Quality Management District (AQMD) or Air Pollution Control District (APCD) will be notified prior to any monitoring. Sample collection will be conducted by staff of the Testing Section or staff of the Air Quality Surveillance Branch of the ARB, or an approved ARB contractor.

A. Siting

The location and time-frame for **ambient** and **application** monitoring are based on direction provided by the DPR in their "Use Information and Air Monitoring Recommendation for Pesticide Active Ingredient" documents. These recommendations are based on historical trends (normally 2 to 3 years prior) and are submitted to the ARB by the DPR approximately 1 year in advance of intended monitoring. The recommendations direct ARB to monitor for a pesticide in specific counties during specific use periods. Pesticide use maps (historical) and histograms are used along with close coordination with staff of the County Agricultural Commissioner's Office to predict areas (and times) of use for the pesticide for the upcoming use year. Approximately one month prior to the scheduled monitoring DPR will reevaluate the historical use trends using the most recent pesticide use data available.

For selection of **ambient** monitoring sites, ARB staff work through authorized representatives of school districts, private companies or city, county or state government agencies. The probe (sampler) siting criteria for **ambient** pesticide monitoring were obtained from the U.S. EPA "Ambient Air Quality Surveillance" criteria (40 CFR, Part 58) and are listed in TABLE I. As per the DPR monitoring recommendations, three to five sites are chosen. The monitoring objective in choosing these sites is to estimate population exposure in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations, or other public buildings). Sampling sites should be located near (in regions of) specific agricultural crops as recommended by the DPR. One additional site is chosen and designated to be an urban area "background" site which is located away from any expected applications. Information will be collected for each site and reported to DPR regarding; 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground. Normally the **ambient** samplers will be located on the roof of a one-story building (e.g., at schools) with the sample cartridge located about 1.5 meters above the roof.

Probe siting criteria for placement of samplers around a pesticide application are the same as for **ambient** monitoring tests (TABLE I). A minimum of four samplers are positioned, one on each side of the field. A fifth sampler is collocated at one position, normally the downwind side (based on prevailing breezes). Once monitoring has begun, the sampling stations are not moved, even if the wind direction has changed. Ideally, samplers should be placed at a minimum distance of 20 meters from the perimeter of the field and should be equidistant from the field. *These requirements are nearly impossible to meet because of the physical limitations of most application sites. Twenty meters from a potential application field invariably places the sampler on another landowner's property, in another field where tractors and other equipment must operate, or into another orchard where the siting criteria cannot be met. Fences, canals, roads, ditches, railroad tracks, brush, trees, houses, barns, livestock, parked equipment, uncooperative neighbors, etc. are common obstacles. Monitors are placed as far as possible, up to 20 meters, from the field. Attempts are always made to center the samplers on the face of a side of the field. The sampler is placed to maximize the distance from the field and to avoid obstructions bordering the field. Conditions at the site will dictate the actual placement of monitoring stations.* Information is collected and reported to DPR regarding; 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that

the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees buildings and other obstacles; 3) the elevation of each sampling station with respect to the field and the orientation of the field with respect to North (identified as true or magnetic North). Determination of an appropriate site for an **application** test is based on the "recommendations" provided by the DPR. Parameters used to choose the site are:

1. crop type,
2. minimum field area of 10 acres,
3. minimum application rate (as directed by the DPR),
4. type of application (normally no preference by the DPR),
5. availability of sites on all four sides of the field which meet the criteria in Table 1 and can be sited 20 meters from the perimeter of the field (quite often this is not possible, i.e., normally 4 sites are chosen but they may not all meet the criteria), and
6. accessibility and security of the sampling sites/equipment.

Monitoring sites (fields) are arranged through communication with, and the voluntary cooperation of, applicators, growers or owners for **application** monitoring. Normally, representatives of the County Agricultural Commissioner's Office will make initial contact with the applicators/growers or will at least provide a list of possible candidates.

TABLE 1. PESTICIDE PROBE SITING CRITERIA SUMMARY

Height Above Ground (Meters)		2-15
Minimum Distance from Supporting Structure (Meters)	Vertical	1
	Horizontal	1
Other Spacing Criteria		1. Should be 20 meters from trees.
		2. Distance from sampler to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the sampler.
		3. Must have unrestricted air flow 270° around sampler.
		4. Samplers at a collocated site (duplicate for quality assurance) should be 2-4 meters apart if samplers are high flow, >20 liters per minute.

B. Schedule

Samples for **ambient** pesticide monitoring will generally be collected over 24-hour periods on a schedule of 4 samples per week (Monday through Friday) for 5 to 7 weeks. Occasionally the normal schedule will be interrupted due to holidays and make-up samples may be collected over weekends.

Individual **application** monitoring schedules will vary based on the type and length of application but will follow the schedule guidelines outlined below in TABLE 2. Ideally, the

monitoring study will include samples taken before, during and for approximately 72 hours following application.

TABLE 2. GUIDELINES FOR APPLICATION SAMPLING SCHEDULE

Sample period begins:	Sample duration time
Background (pre-application)	Minimum of 12 hours
During application	Length of application time
End of application	1 hour (or up to 1 hour before sunset) ¹
1 hour post-application	2 hours (or up to 1 hour before sunset) ¹
3 hour post-application	3 hours (or up to 1 hour before sunset) ¹
6 hour post-application	6 hours (or up to 1 hour before sunset) ¹
1 hour before sunset	Overnight ² (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour after sunrise	24-hour (until 1 hour after sunrise)

¹ These sample duration times will be adjusted depending on length of application and time of sunset.

² All overnight samples must include the period from one hour before sunset to one hour after sunrise. If the application extends beyond "1 hour before sunset" then the overnight sample will be started at the end of application.

Occasionally, a pesticide application may occur all day long and over the course of two or more days. In these instances samples are collected during the first daily application, followed by a sample from end of application to 1 hour before sunset, followed by an overnight sample ending at either the start of application or 1 hour after sunrise the next morning (same for second or more application days). Following the end of the application, samples are collected according to the above schedule, starting with the 1-hour sample.

C. Meteorological Monitoring

Data on wind speed and direction, barometric pressure, relative humidity and air temperature will be collected during application monitoring by use of an on-site meteorological station. The meteorological data will be acquired using a data logger at a minimum of 15 minute intervals (averages). Meteorological systems will be calibrated as specified in the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring." Meteorological data are not collected for the ambient monitoring programs.

III. Method Validation

A. Method Detection Limit

The method detection limit (MDL) is defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank (that may be zero) with a specified confidence level for a given method and matrix.

MDL is defined as $3.14 \times s$; where s is equal to the standard deviation of seven replicate spiked samples (e.g., XAD sample cartridges). The spiked samples are prepared and analyzed in the same way as actual samples. The spikes should be prepared at a concentration that is between one to five times the estimated MDL.

B. Estimated Quantitation Limit

The estimated quantitation limit (EQL) is the recommended lowest level for quantitative decisions based on individual measurements for a given method and representative matrix. This EQL is defined as $5 \times \text{MDL}$.

C. Reproducibility

The reproducibility of the method should be determined by performing five replicates at three different concentrations. The lowest level should be at or near the EQL. The average and standard deviation of each set of replicates should be determined and reported.

D. Extraction Efficiency

Extraction efficiency is defined as the amount of pesticide recovered from a spiked sample. Three replicates at two levels and blank should be extracted with the average and standard deviation determined for the replicates. The average amount divided by the amount added multiplied by 100 will give the percent recovery. Recommended recoveries should be between 70-130%.

E. Sampling Efficiency

Sampling efficiency is determined by spiking a sample with a known amount of pesticide. The spiked sample is placed in a sampler and set to the same flow rate and time that samples are collected. At a minimum three replicate spiked samples at a concentration two times the EQL of the method and a collocated background are collected. The samples are extracted and average recovery and standard deviation of the spike samples are determined.

F. Breakthrough

Breakthrough is determined by using a two stage sampling media (usually a filter or resin). The front stage is spiked with a known quantity of the pesticide. The breakthrough study samples are normally spiked at a relatively high level, e.g., at a level that might be observed

during an application study. If time and resources permit, both low and high level spike studies are run. The backup will be the same filter or resin type and placed in series with the front filter or resin. Air is passed through the sampler at the same flow rate and sample time as a real sample (minimum sample time of 24 hours). The front and backstage are recovered and extracted separately. If breakthrough is observed then the sampling strategy must be reviewed, modified and retested before the start of a sampling project.

G. Freezer Storage Stability

Spiked samples should be stored under the same conditions as the samples and for the anticipated time that the samples are stored. Recoveries are determined. A high (either at a level expected during the application study or at the high end of the calibration curve) and a low (1 to 2 times the EQL) concentration set should be studied. A set consists of three replicate spikes each for 3 time intervals.

IV. Field Sampling Quality Control Procedures

Monitoring programs will include the following quality control procedures:

A. Sample Labels

Sample labels will be affixed either directly to the sampling cartridge or will be placed in the individual sample container (e.g., culture tube or zip-lock bag). The sample labels will include at least the following information.

1. Pesticide name and the ARB project number.
2. Log number
3. Sample I.D.
4. Monitoring Location
5. Sampling end date
6. General comments

B. Log Sheets

Field data log sheets will be used to record the sampling log number, sample I.D., start and stop dates, start and stop times, start and end flow rate, initials of individuals conducting sampling, malfunctions, leak checks (at the beginning and end of each sampling period, see Appendix I), weather conditions (e.g., rain) and any other pertinent data which could influence sample results. Refer to Appendix I for a recommended log sheet format.

C. Chain of Custody Forms

Attached as Appendix II is a recommended format for chain of custody (COC) sheets. A COC sheet must accompany any/all samples during transport, transfer or storage. All exchanges of sample possession must be recorded. The laboratory will keep copies of the COCs and

forward the originals to the project engineer. The original COC sheets must be retained in the pesticide project file.

D Flow Controller Calibration and Audit

Field flow controllers (rotameter, electronic flow controller or critical orifice) shall be calibrated against a referenced standard prior to a monitoring period. This referenced standard (e.g., digital bubble flowmeter or electronic digital mass flowmeter) must be verified, certified or calibrated with respect to a primary standard at least once per year by the Quality Management and Operations Support Branch (QMOSB) of ARB. Appendix V shows an example of a form to document the flow controller calibration results.

A flow audit of the field air samplers will be conducted by the QMOSB before each pesticide monitoring project. If results of this audit indicate a difference from the calibrated values of more than 10%, then the field flow controllers should be rechecked until they meet this objective. A written report of the QMOSB audit results will be included as an appendix in the final monitoring report.

Sampling flow rates should be checked in the field and noted before and after each sampling period. A separate, certified flow meter (i.e., not the one used in the sample train to control flow) will be used to check the flow. The flow rates should be checked after the initial sampling system leak check and before the "end" sampling system leak check.

E. Background Sampling

A background sample will be taken at all sites (4 sides) prior to an application test. The duration of the background sample should be sufficient to achieve the pesticide target 24-hour EQL, as directed by the DPR prior to the test, and must be a minimum of twelve hours and up to 24 hours if scheduling permits. This sample will establish if any of the pesticide being monitored is present in the air prior to the application. It also can indicate if other environmental factors are interfering with the detection of the pesticide of concern during analysis.

While one of the sampling sites for ambient monitoring is referred to as an "urban area background," it is not a background sample in the conventional sense because the intent is not to find a non-detectable level or a "background" level prior to a particular event (or application). This site is chosen to represent a low probability of finding the pesticide and a high probability of public exposure if significant levels of the pesticide are detected at this urban background site. Detectable levels of some pesticides may be found at an urban area background site if they are marketed for residential as well as commercial/agricultural use. An example of an urban area background site is the ARB air monitoring station in downtown Fresno.

F. Collocated Samples

For both ambient and application monitoring, the method precision will be demonstrated in part by collecting samples from collocated samplers (replicate analysis of samples also relates to method precision). An additional ambient sampler will be collocated at each of the sampling

sites. Normally, collocated samples will be collected at each **ambient** site every Wednesday for each week of sampling. The samplers should be located at least two meters apart if they are high volume samplers (>20 Lpm) in order to preclude airflow interference. This consideration is not necessary for low flow samplers. The collocated sampler for **application** monitoring should be positioned at the downwind sampling site where the highest concentrations are expected. The collocated site is not changed after the study starts.

G. Trip Blanks

A trip blank should be included with each batch of samples submitted for analysis. This will usually require one trip blank for an **application** monitoring study and one trip blank per week for an **ambient** monitoring program. Trip blanks are prepared by opening a sampling cartridge (e.g., breaking the ends of an XAD glass tube) in the field followed by normal labeling and sample transport (i.e., along with the samples).

H. Laboratory, Trip and Field Spikes

The *laboratory, trip and field* spikes are prepared, extracted and analyzed at the same time and they are generally all spiked at the same level. The *laboratory* spikes are immediately placed in the laboratory refrigerator (or freezer) and kept there until extraction and analysis. The *trip* spikes are kept in the freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for the samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. The *field* spikes are stored and transported in the same way as the trip spikes. However, field spikes are obtained by sampling ambient air through the spiked cartridge at the same environmental and experimental conditions as those occurring at the time of the study.

Ambient field spikes are collocated (same location, flow rate and sampling period) with a sample collected at the urban background sampling site (to minimize background concentrations). **Ambient** field spikes are normally prepared at a level of approximately 2 times the EQL, or at a level representative of ambient concentrations.

Application study field spikes are collocated with the background samples collected at the four sides of the application site (i.e., one background and one field spike per side). **Application** field spikes are normally prepared at a level close to expected air concentrations. Field spike results are corrected by subtracting the amount of pesticide residue found in the collocated, unspiked sample before calculation of residue recoveries.

I. Transportation of Samples

All samples will be capped, placed in a sample container (e.g., culture tube or zip-lock bag) and placed in an ice chest on dry ice immediately following sample collection and labeling. The samples will remain on dry ice until transferred to the laboratory and will then be stored in the lab refrigerator or freezer. Any special handling procedures will be identified during the method validation and will be outlined in the SOP.

J. Meteorological Station Calibration

Meteorological station calibration procedures will be performed as specified by the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring."

K. Preventive Measures

To prevent loss of data, spare pumps and other sampling materials should be kept available in the field by the operator. A periodic check of sampling pumps, meteorological instruments, extension cords, etc., should be made by sampling personnel.

V. Analysis

Method development and analysis of all field samples must be conducted by a fully competent laboratory. To ensure the capability of the laboratory, a systems audit may be performed, upon request, by the ARB Quality Management and Operations Support Branch (QMOSB) prior to the first analysis per a pesticide project. After a history of competence is demonstrated, an audit prior to each pesticide project is not necessary. However, during each pesticide project, the spiked samples discussed above should be provided to the laboratory to demonstrate accuracy and precision. These spiked samples will be prepared by qualified ARB laboratory staff.

If using GC/MS, isotope dilution is the recommended method for quantitation. Isotope dilution is where the isotope analog of the target compound is spiked to the sample prior to sample preparation. The internal standard goes through the same sample and analytical steps that the target analyte does thus compensating for losses during sample preparation and instrument variability during analysis. When no isotope is available an internal standard is recommended. An internal standard is spiked to the sample just prior to analysis. The internal standard compensates for instrument variability. If no suitable internal standard is found then an external standard method may be used.

VI. Analytical Quality Control Procedures

A. Mass Spectrometer Tuning (if MS is used)

A daily tune shall be performed using perfluorotributyl amine (PFTBA). The MS should be calibrated to optimize the MS for the mode of operation and type of pesticide analyzed. Documentation and performance criteria shall be specified in the standard operating procedure. A record of the tune for each batch should kept on file. A daily tune must be performed prior to the analysis of an analysis sequence and every 24 hours during an analysis sequence. If longer intervals between tunes are used, then the stability of the MS must be demonstrated during the method development phase and approved prior to the sample analysis.

B Calibration

Initial Calibration

At the beginning of method development an initial multi-point calibration curve is performed to demonstrate the calibration range of the pesticide analyzed. A typical multi-point calibration consists of 5 different concentrations with a single replicate at each concentration. The calibration range usually should not exceed 40:1 with the lowest level standard at the EQL unless there is no need to measure values as low as the EQL. Depending on the linear range of the analyte, multi-points with other than 5 levels may be used although a multi-point with less than 3 levels is not permitted. Typically a linear calibration is preferred although a dynamic range using a quadratic is acceptable. For quadratic calibration curves quantitation can only be performed within the calibration range. Sample above the calibration curve must be diluted into the calibration range and reanalyzed.

Daily Calibration

Prior to the analysis of a set of samples a calibration must be performed. This calibration is called the daily calibration. The daily calibration is either a multi-point calibration or a mid-point calibration. The mid-point calibration consists of a single calibration at the mid-point of the initial multi-point calibration curve. If the mid-point is within a prescribed range (i.e., within $\pm 20\%$ of the original calibration) as determined from the initial calibration then the original initial calibration is still considered valid and the response is replaced. If the mid-point calibration is outside that range then another multi-point calibration must be performed. A calibration check at the same level is also run. If the mid-point calibration and the midpoint calibration check are within a prescribed range (i.e., $\pm 20\%$) of each other then analysis can begin. If the calibration check is outside the specified range then the problem must be rectified before analysis can begin.

C. Reagent Blanks.

A reagent (solvent) blank is performed at least for every batch of reagent used. The reagent blank uses the same solvent that was used for the sample preparation. The blank should be free of interferences. If low level contamination of the pesticide residue is found in the reagent blank (as may happen when using isotope dilution), then a reagent blank will be performed before analysis of each batch of samples. A reagent blank must be analyzed after any sample which results in possible carry-over contamination.

D. Laboratory Control Blank.

A laboratory blank is run with each batch of samples. A laboratory control blank (blank sampling media, e.g., resin cartridge or filter) is prepared and analyzed by the same procedures as used for field samples. Laboratory blank results must be no higher than 20% of the lowest value reported.

E. Laboratory Control Spike.

A laboratory control spike (LCS) is a resin cartridge spiked (at the level of the midpoint of the daily calibration runs) with a known amount of standard. The LCS is prepared and analyzed the same way as the samples. Two LCS are performed for each batch of samples. Laboratory control spikes need to be within 40% ($100 \times \text{difference/average}$) of each other and have recoveries that are $\pm 30\%$ of the theoretical spiked value. If in the method development stage it is found that the differences or recoveries are larger, then they must be approved by ARB before the analysis can begin.

F. Calibration Check Samples.

A calibration check sample (CCS) is a mid-point standard run after every tenth sample in an analysis set. The purpose of the CCS is to ensure sample drift is within specified values. The CCS sample must be within $\pm 25\%$ of its theoretical value. If the standard is outside this range, then the samples associated with that calibration check sample must be reanalyzed. If in the method development stage it is found that the CCS variation is greater than 25%, then the percent variation limit used for the method must be approved by the ELB Branch Chief before the analysis can begin.

G. Duplicate Analysis.

A duplicate analysis is a sample analyzed in duplicate as a measure of analytical precision. Every tenth sample of an analysis set must be run in duplicate.

H. Standard Operating Procedures

Analytical methods must be documented in a Standard Operating Procedure (SOP) before monitoring begins. The recommended format for the SOP is provided in Appendix III. The SOP will include a discussion of all of the procedures outlined above in this section. The SOP will also include a summary of method development results as outlined in Section III above.

VII. Sampling and Analysis Protocol

Prior to conducting any pesticide monitoring, a sampling and analysis protocol, using this document as a guideline, will be written by the ARB staff. The protocol describes the overall monitoring program, the purpose of the monitoring and includes the following topics:

1. Identification of the sample site locations, if possible.
2. Description of the sampling train and a schematic showing the component parts and their relationship to one another in the assembled train, including specifics of the sampling media (e.g., resin type and volume, filter composition, pore size and diameter, catalog number, etc.).

3. Specification of sampling periods and flow rates.
4. Description of the analytical method (SOP included if possible).
5. Tentative test schedule and expected test personnel.
6. Safety information specific to the pesticide monitored.

Specific sampling methods and activities will also be described in the monitoring plan (protocol) for review by ARB and DPR. Procedures which apply to all sampling projects include: (1) sample log sheets (APPENDIX I), (2) chain of custody forms (APPENDIX II), (3) sunlight and rain shields for sample protection during monitoring, (4) sample storage in an ice chest on dry ice until delivery to the laboratory, (5) trip blanks and, (6) laboratory, trip and field spikes. The protocol should include: equipment specifications (when necessary), special sample handling and an outline of sampling procedures. The protocol should specify any procedures unique to a specific pesticide.

VIII. Final Reports and Data Reduction

The mass of pesticide found in each sample should be reported along with the volume of air sampled (from the field data sheet) to calculate the mass per volume for each sample. For each sampling date and site, concentrations should be reported in a table as $\mu\text{g}/\text{m}^3$ (microgram per cubic meter) or ng/m^3 (nanogram per cubic meter). When the pesticide exists in the vapor phase under ambient conditions, the concentration should also be reported as ppbv (parts per billion, by volume) or the appropriate volume-to-volume units at conditions of 1 atmosphere and 25 °C. Collocated samples should be reported separately as raw data, but then averaged and treated as a single sample for any data summaries. For samples where the end flow rate is different from that set at the start of the sampling period, the average of these two flow rates should be used to determine the total sample volume.

The final report should indicate the dates of sampling as well as the dates of laboratory receipt, extraction and analyses. These data can be compared with the stability studies to determine if degradation of the samples has occurred.

Final reports of all monitoring studies are sent to the Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, the Department of Health Services, the Agricultural Commissioner's Office, the local AQMD as well as the applicator and/or the grower. Final reports are available to the public by contacting the ARB Engineering and Laboratory Branch.

A. Ambient Reports

The final report for ambient monitoring should include a map of the monitored area which shows nearby towns or communities and their relationship to the monitoring stations, along with a list of the monitoring locations (e.g., name and address of the business or public building)

including the locations Range/Township/ Section. A site description should be completed for any monitoring site which might have characteristics that could affect the monitoring results (e.g., obstructions). For ambient monitoring reports, information on terrain, obstructions and other physical properties which do not conform to the siting criteria or may influence the data should be described. Information will be collected for each site and reported to DPR regarding: 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground.

Ambient data should be summarized for each monitoring location by maximum and second maximum concentration, average ("detected" results are factored in as $(MDL + EQL)/2$, <MDL results are factored in as $MDL/2$), total number of samples, number of samples above the estimated quantitation limit (EQL), number of samples "detected" and the number of samples below the MDL. For this purpose, collocated samples are averaged and treated as a single sample.

B. Application Reports

Similarly, a map or sketch indicating the general location (nearby towns, highways, etc.) of the field chosen for application monitoring should be included as well as a detailed drawing of the field itself and the relative positions of the monitors. For application monitoring reports, as much data as possible should be collected about the application conditions (e.g., formulation, application rate, acreage applied, length of application and method of application). This may be provided either through a copy of the Notice of Intent, the Pesticide Control Advisor's (PCA) recommendation or completion of the Application Site Checklist (APPENDIX IV). Meteorological data will be reported in 15 minute averages for the application site during the monitoring period. Meteorological and pesticide air concentration data will also be summarized as wind roses for each application sampling period. The raw meteorological data file will also be transferred to DPR on 1.44 mb floppy disk.

C. Quality Assurance

All quality control and quality assurance samples (blanks, spikes, collocated etc.) analyzed by the laboratory must be reported. Results of all method development and/or validation studies (if not contained in the S.O.P.) will also be reported. The results of any quality assurance activities conducted by an agency other than the analytical laboratory should be included in the report as an appendix. This includes analytical audits, system audits and flow rate audits.

APPENDIX I
SAMPLE FIELD LOG BOOK

SAMPLE FIELD LOG BOOK
Project: Pesticide Air Monitoring
Project #:

[illegible]

APPENDIX II
CHAIN OF CUSTODY FORM

CHAIN OF CUSTODY FORM
 CALIFORNIA AIR RESOURCES BOARD
 MONITORING AND LABORATORY DIVISION
 P.O. Box 2815, Sacramento CA 95812
 PESTICIDE
 CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
 Sample/Run #: _____ Time: _____
 Job Name: _____
 Sample Location: _____
 Type of Sample: _____
 Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE
Sample Collected					
			GIVEN BY	TAKEN BY	freezer, ice or dry ice
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					

LOG #	ID #	

RETURN THIS FORM TO: _____

APPENDIX III

ANALYTICAL STANDARD OPERATING PROCEDURE FORMAT

ELEMENTS TO BE INCLUDED IN LABORATORY STANDARD OPERATING PROCEDURES FOR PESTICIDE AIR ANALYSIS

Engineering and Laboratory Branch
Air Resources Board
April 1999

I. SCOPE

- A. Description of scope and detection limits of pesticide(s) to be analyzed.
- B. Documents and references upon which method is based.
- C. Definitions of any special terms must be given.

II. SUMMARY OF METHOD

- A. General description of sampling and analytical procedure. Enough information should be included for an experienced analyst to readily recognize the principles of operation.

III. INTERFERENCES AND LIMITATIONS

- A. Comments made here should cover both analytical and sampling problems, known and potential.

IV. EQUIPMENT AND CONDITIONS

- A. INSTRUMENTATION: As specific a description as possible. Any modifications or improvements of the basic system must have an accompanying schematic. For chromatographic analysis list columns, flow rates, temperatures, detectors, amplifier ranges and attenuations, sample volumes, etc.
- B. AUXILIARY APPARATUS: Provide a description of the function and operating conditions. Include a description of the sampling equipment if the equipment is specific to this method. For example, "Vacuum pump, ACME Model 62, capable of maintaining a 1 CFM Air Flow at 10" vacuum."

V. REAGENTS AND MATERIALS

- A. Provide a list of all reagents used and specify purity and/or grade.
- B. Describe preparation of any special reagents for analysis and sampling.
- C. Specify composition, preparation, and concentrations of stock, intermediate, and working standards.
- D. Describe in detail any necessary safety precautions for handling and disposition of chemicals.

VI. PROCEDURES

A. FIELD SAMPLING TECHNIQUES

1. Refer to appropriate Field Sampling S O P for exact details of sampling, chain of custody and sample identification procedures.
2. Describe equipment used.
3. List sampling conditions: materials, flow rates, etc.
4. Describe any potential problems and limitations, with means of controlling such problems.
5. Describe any methods used to split samples for other types of analyses, if necessary.

B. LABORATORY SAMPLE PREPARATION/PRETREATMENT TECHNIQUES

1. Describe (or refer to an appropriate section of a Laboratory Quality Control Manual) a protocol for sample log-in procedures, including document control and sample examination for damage. Any possible hazards due to toxic or flammable chemicals must be clearly identified. Any sample storage requirements, such as immediate refrigeration or protection for light must be noted.
2. Describe any methods used for preconcentration, dilution clean-up filtration, extraction, concentration, etc., after the sample is received from the field.

C. ANALYSIS

1. Describe as clearly as possible the exact instrument configuration and set-up techniques
2. Describe analysis blank and calibration procedure with associated limits on precision and accuracy. Describe analysis of Control Samples and limits of the resulting data. Describe steps taken in an "out-of-control" situation. Specify the format and location of recorded calibration and Control Sample data.
3. Describe sample analysis. Description must include an example of expected data (for example, a sample chromatogram with all components of interest labeled).
4. Give calculation procedures for results. Describe data recording and data submittal.

VII. PERFORMANCE CRITERIA

- A. Describe frequency of duplicate analyses, spikes, field blanks, and acceptable limits of each.
- B. Describe frequency of multiple standard analyses to check method linearity and detection limit.
- C. If confirmatory method is used, refer to specific S.O.P.

VIII. METHOD VALIDATION

Validation testing should provide an assessment of accuracy, precision, interferences, method recovery, method detection limit and estimated quantitation limit. Method documentation should include confirmation testing with another method when possible, and quality control activities necessary to routinely monitor data quality control such as use of control samples, control charts, use of surrogates to verify individual sample recovery, field blanks, lab blanks and duplicate analysis. All data should be properly recorded in a laboratory notebook.

The method should include the frequency of analysis for quality control samples. Analysis of quality control samples are recommended before each day of laboratory analysis and after every tenth sample. Control samples should be found to be within control limits previously established by the lab performing the analysis. If results are outside the control limits, the method should be reviewed, the instrument recalibrated and the control sample reanalyzed.

All quality control studies should be completed prior to sampling and include recovery data from at least three samples spiked at least two concentrations. Instrument variability should be assessed with three replicate injections of a single sample at each of the spiked concentrations. A stability study should be done with triplicate spiked samples being stored under actual conditions and analyzed at appropriate time intervals. This study should be conducted for a minimum period of time equal to the anticipated storage period. Prior to each sampling study, a conversion/collection efficiency study should be conducted under field conditions (drawing ambient air through spiked sample media at actual flow rates for the recommended sampling time) with three replicates at two spiked concentrations and a blank. Breakthrough studies should also be conducted to determine the capacity of the adsorbent material if high levels of pesticide are expected or if the suitability of the adsorbent is uncertain. The following data will be included in the SOP.

- A. A table describing linearity (correlation coefficients), accuracy (method bias), precision (standard deviations at all levels analyzed), and detection.
- B. Data on sampling efficiencies, stability, pertinent breakdown products, break through volumes and desorption efficiencies.
- C. Data on storage stability and conditions for samples and standards.
- D. References to quality assurance information derived from published and/or interlaboratory sources if available.

APPENDIX IV
APPLICATION CHECKLIST

APPLICATION CHECKLIST

1. Pesticide:
2. County:
3. Crop:
4. Field Address:
5. Field Location (R/T/S):
6. Field Size (acres):
7. Contact Person:
8. Background Monitoring Period:
9. Target EQL Met?:
10. Product Applied:
11. Application Rate:
12. Comments on Tank Mix:
13. Method of Application (ground, air, irrigation, injection, tarping etc.):
14. Start of Application:
15. End of Application:
16. Pattern of Application: (e.g., east to west):
17. Weather Conditions:
18. Met Station Location (and elevation):
19. Any Other Applications in Area:
20. Sampler Elevations:

- ___ Camera pictures of each sampler from all 4 directions
- ___ Camcorder video of each sampler in relation to field and surroundings
- ___ Rotameter #s logged
- ___ Check dimensions of field with known acreage (43560 ft²/acre) & compare sides
- ___ Crops around field labeled on diagram

APPENDIX V
FLOW CONTROLLER CALIBRATION FORM

FLOW CONTROLLER; 1-POINT FLOW CALIBRATION SHEET

Project: _____ Pre: _____ Post: _____ Project #: _____ Date: _____

Desired Flow Rate: _____ Calib. by: _____ (name)

BUBBLEMETER READINGS

Controller ID:	_____	_____	_____	_____	_____
Controller Set:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
Average:	_____	_____	_____	_____	_____
Deviation:	_____	_____	_____	_____	_____
Controller ID:	_____	_____	_____	_____	_____
Controller Set:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
Average:	_____	_____	_____	_____	_____
Deviation:	_____	_____	_____	_____	_____

Average of Averages _____ :

PROCEDURE

1. Set-up sampler as if to collect sample, including filled sample cartridge.
2. Set flow controller to achieve desired flowrate and record controller setting.
3. Observe and record Bubblemeter flow (on form or direct to floppy - Change File name).
4. Reset to zero. Then repeat step 3 two more times.
5. Calculate the average of 3 readings.
6. Repeat steps 1 thru 5 for each Rotameter.
7. Average of Averages and Deviation automatically calculated. Replace any Rotameters that deviate by 10% or more from the Average of Averages.
8. QA Section will get a copy for comparison with their results for the same setups.

Attachment II

Standard Operating Procedures for the Analysis of Methyl Bromide and Telone in Ambient Air Canister Samples

California Environmental Protection Agency

 **Air Resources Board**

**Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division**

**Draft
Standard Operating Procedure
Sampling and Analysis of Bromomethane In Silco Canisters**

**version
July 26, 2000**

Approved by:

1. SCOPE

This method is for the sampling and analysis of Methyl Bromide in ambient air using 6 liter Silco canisters for sample collection. Collected samples are analyzed by gas chromatography/mass spectrometry.

2. SUMMARY OF METHOD

Ambient air is collected into evacuated 6 liter Silco canisters. Field sampling uses a subatmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using deuterated bromomethane (bromomethane-d3) as an internal standard.

3. INTERFERENCES/LIMITATIONS

Interferences may result from improperly cleaned canisters. Analysis of samples containing high concentrations of bromomethane may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.

4. EQUIPMENT AND CONDITIONS

A. Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:

Detector: 280° C

Injector: 220° C

Column: J&W DB-624, 60 meter, 0.25mm I.D., 1.40 micron film thickness

GC temperature program: initial 40° C, initial time 5.0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min

Carrier Gas: Helium, zero grade

Hewlett Packard 5973 mass selective detector:

Acquisition Mode: SIM

Tune File: PFTBA Autotune

Ions Monitored: 93.8, 95.8, 96.8, 98.8

Solvent Delay: 5.00 min

Nuteck 3550A cryogenic concentrator:

Valve Oven: 60°

Autosampler Oven: 50°

Nafion Dryer: ambient
Sample Line: 100°
Cryotrap: -160° C to 150°
Transfer Line: 150° C
Cryofocus: -175° C to 150° C
Sample Size: 400 ml
Internal Standard Loop: 2 ml

B. Auxiliary Apparatus

Compressed helium: zero grade
Compressed air: ultra zero grade
Compressed nitrogen: zero grade
Liquid nitrogen for cryogenic concentrator
Certified bromomethane standard
Restek, 6.0 liter Silcosteel canisters with silcosteel valve
Pressure gauge, -30mm to 30 psig
Canister cleaning system (Appendix 1)

5. ANALYSIS OF SAMPLES

- 1) Perform a PFTBA autotune and evaluate tune criteria (Appendix 2). Place a copy of the autotune results in the autotune folder.
- 2) Check and record the pressure in the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
- 3) Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a system blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
- 4) Prepare a sample sequence for the Nuteck.. The sample sequence should be organized as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within 20% of its assigned value the system must be recalibrated.
- 5) Attach the sample canisters to the Nuteck autosampler ring as per the sequence. Execute the Nuteck sequence.
- 6) Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization prior to analysis. Instrument reports will be in units of ug/m³ and must be corrected for the analysis dilution using the following calculation:

$$(Fp / Ip) \times Ci = Cr$$

Ip = initial canister pressure in mm Hg

Fp = final canister pressure in mm Hg
Ci = concentration from the analysis report in ug/m3
Cr = reported concentration in ug/m3

6 QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five replicate samples of bromomethane standard at three concentrations (low, mid and high range). Reproducibility study results are presented in Table 1.

B. Linearity

A 6-point calibration was performed on 7/25/2000. Calibrators from 0.027 to 0.861 ug/m3 (Appendix 3) were used to construct a calibration curve by linear regression analysis.

$$\text{Response Ratio} = 9.56 \text{ e } +001 \times \text{Amount} + 2.63 \text{ e } -001$$

$$R^2 = 0.999$$

C. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spikes, the method detection limit (MDL), and the estimated quantitation limit (EQL) for bromomethane is calculated by:

$$\text{MDL} = 3.14 \cdot s$$

$$\text{EQL} = 5 \cdot \text{MDL}$$

where: s = the standard deviation of the response calculated for the seven replicate spikes. Given s = 0.0015 ug/m3 for the seven samples, the MDL and EQL are calculated as follows.

$$\text{MDL} = 3.14 (0.0015 \text{ ug/m}^3) = 0.0047 \text{ ug/m}^3$$

$$\text{EQL} = 5(0.0047 \text{ ug/m}^3) = 0.024 \text{ ug/m}^3$$

Assuming a 1:1.5 dilution to pressurize ambient samples:

$$\text{EQL} = 1.5 (2.4 \text{ ug/m}^3) = 0.036 \text{ ug/m}^3$$

Results are reported to 3 significant figures above the EQL. Results below EQL and above MDL are reported as det (detected). Results less than MDL are reported as less than MDL.

D. Storage Stability

Conduct a storage stability study of bromomethane over a 3-week period. Four (4) canisters are spiked with bromomethane at approximately 0.5 ppb. The spiked canisters are stored at ambient temperature and analyzed on storage weeks 0, 1, 2, 3. Restek conducted a stability study for methyl bromide in Silco cans and demonstrated that it is stable at 1 ppbv for at least 16 days. A Special Analysis Section stability study is currently being conducted.

E. Safety Precautions

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

DISCUSSION:

Table 1

REPRODUCIBILITY STUDY

Low Level	Methyl Bromide (ng/m3)
-----------	------------------------

1	48.59
2	47.48
3	49.49
4	47.77
5	46.06

Average	47.88
SD	1.283
RSD	2.68

Medium Level	
--------------	--

1	168.51
2	175.56
3	170.05
4	170.32
5	166.02

Average	170.09
SD	3.50
RSD	2.06

High Level	
------------	--

1	859.54
2	873.08
3	858.87
4	841.56
5	852.66

Average	857.14
SD	11.46
RSD	1.34

Notes:

m3	cubic meters
ng	nanograms
RSD	Relative standard deviation
SD	standard deviation

Appendices

Appendix 1

CAN CLEANING PROCEEDURE

The canister cleaning procedure uses repeated cycling from -30 inches Hg to 30 pounds per square inch gauge with humidified ultra pure nitrogen. Each cycle is 24 minutes (12 minutes vacuum & 12 minutes pressure) at 80 degrees C. The procedure includes eight complete cycles.

Canister data should be logged into the canister cleaning book for each cleaning batch. When the batch is complete one canister is chosen for analysis. The canister is pressurized with ultra pure nitrogen and analyzed by the GCMS method. If target analytes are not less than two times their MDL the entire batch should be cleaned again.

Procedure:

A. Fill dewar with LN2

1. Remove dewar cover.
2. CAREFULLY place hose from LN2 tank into dewar (Orange and silver container behind oven).
3. Open LN2 tank 3 turns
4. Close tank when LN2 can be seen near top of dewar.
5. CAREFULLY remove hose and replace dewar cover.

B. Turn on the vacuum pump.

1. Switch is located on pump to the left of the can oven.

C. Open N₂ Tank

1. Open regulator on N₂ tank to the left of the can oven.

D. Load cans in oven

1. Attach cans to manifold in oven and tighten.
2. If you are cleaning less than 8 cans the unused ports must be capped.
3. Open the can valve

E. Start Timers Located on top left of can oven

1. Push Auto button on top timer and Auto light should come on. If the light is off, hit the button again and it should light.

2. Push the Run button on the bottom timer. The 1 light should light up briefly then switch to 2. On the top timer the 2 light should light.
3. Push the ADV on the top timer. The 2 light should go off and the 1 light should light. The system should also begin to evacuate.
4. Verify the system evacuates all the way by reading the gauge on the back of the oven. The gauge should go to -30 psi.

F. Fill cans and shutdown system.

1. Close all can valves except the ones you want to fill.
2. On the top timer hit the ADV button until the 2 light comes on.
3. Monitor the pressure of the cans on the gauge on the back of the oven.
4. Close can valves when filled.
5. Close N₂ Regulator
6. Turn off Vacuum pump.
7. Remove cans and place plugs on manifold ports.
8. Hit the stop button on both timers.

Appendix 2

Autotune Criteria

A standard autotune should be performed on the detector each day prior to sample analysis. The autotune report should be evaluated for the following:

1. An unusual change in the EM voltage
2. Peak width for all tune masses should be between 0.4 aAmu and 0.6 amu.
3. The relative abundance of tune mass 219.0 should be greater than 30% of tune mass 69.0.
4. Isotope abundance ratio for tune mass 70.0 should be between 0.54% and 1.6 %; isotope abundance ratio for tune mass 220.0 should be between 3.2% and 5.4%.
5. Masses 28 and 18 should be evaluated to check for air leaks in the system.

If autotune criteria are not met the system should be evaluated for problems. After the system problems are corrected the detector should be autotuned prior to sample analysis. Autotune reports should be filed in the instrument autotune folder.

Appendix 3

Calibration Standard Preparation for Bromomethane and Telone

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gases and has the following specifications:

Cylinder No ALM057764
Expiration date 11/17/00
BROMOMETHANE 5.77 PPB/M
CIS 1,3-DICHLOROPROPENE 5.45 PPB/M
TRANS 1,3-DICHLOROPROPENE 5.45 PPB/M

Working analysis standard is prepared by diluting the stock gas using the following procedure.

1. A 6 liter Silco canister is evacuated to -30° Hg.
2. 692 ml of stock gas is transferred to the canister using a gas tight syringe.
3. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter.
4. The canister is pressurized to 29.4 psig with ultra pure nitrogen.

The canister will contain analytes at the following concentrations:

BROMOMETHANE 0.861 ug/m³
CIS 1,3-DICHLOROPROPENE 0.953 ug/m³
TRANS 1,3-DICHLOROPROPENE 0.953 ug/m³

The standard sample injection is 400 ml. A calibration curve is generated by using the cryo sampler to introduce the following volumes of working standard to the GCMS.

<u>Volume</u>	<u>methylbromide</u>	<u>cis 1,3-DCP</u>	<u>trans 1,3-DCP</u>
400 ml	0.861 ug/m ³	0.953 ug/m ³	0.953 ug/m ³
200 ml	0.431 ug/m ³	0.476 ug/m ³	0.476 ug/m ³
100 ml	0.215 ug/m ³	0.238 ug/m ³	0.238 ug/m ³
50 ml	0.108 ug/m ³	0.119 ug/m ³	0.119 ug/m ³
25 ml	0.054 ug/m ³	0.060 ug/m ³	0.060 ug/m ³
15 ml	0.032 ug/m ³	0.036 ug/m ³	0.036 ug/m ³

California Environmental Protection Agency



Air Resources Board

**Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division**

**Draft
Standard Operating Procedure
Sampling and Analysis of Telone In Silco Canisters**

**version
July 26, 2000**

Approved by:

1. SCOPE

This method is for the sampling and analysis of Telone in ambient air using 6 liter Silco canisters for sample collection. Telone is a mixture of cis-1,3 Dichloropropene and trans-1,3 Dichloropropene. This method analyzes and reports each isomer as a separate compound. Collected samples are analyzed by gas chromatography/mass spectrometry

2. SUMMARY OF METHOD

Ambient air is collected into evacuated 6 liter Silco canisters. Field sampling uses a subatmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using 1,2-dichloropropane-d6 as an internal standard.

3. INTERFERENCES/LIMITATIONS

Interferences may result from improperly cleaned canisters. Analysis of samples containing high concentrations of Telone may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.

4. EQUIPMENT AND CONDITIONS

A. Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:

Detector: 280° C

Injector: 220° C

Column: J&W DB-624, 60 meter, 0.25mm I.D., 1.40 micron film thickness

GC temperature program: initial 40° C, initial time 5.0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min

Carrier Gas: Helium, zero grade

Hewlett Packard 5973 mass selective detector:

Acquisition Mode: SIM

Tune File: PFTBA Autotune

Ions Monitored: 66.8, 68.8, 74.8, 76.8, 110.0

Solvent Delay: 5.00 min

Nuteck 3550A cryogenic concentrator:

Valve Oven 60°
Autosampler Oven 50°
Nafion Dryer ambient
Sample Line 100°
Cryotrap -160° C to 150°
Transfer Line 150° C
Cryofocus: -175° C to 150° C
Sample Size 400 ml
Internal Standard Loop: 2 ml

B. Auxiliary Apparatus

Compressed helium: zero grade
Compressed air: ultra zero grade
Compressed nitrogen: zero grade
Liquid nitrogen for cryogenic concentrator
Certified bromomethane standard
Restek, 6.0 liter Silcosteel canisters with silcosteel valve
Pressure gauge, -30mm to 30 psig
Canister cleaning system (Appendix 1)

5. ANALYSIS OF SAMPLES

- 1) Perform a PFTBA autotune and evaluate tune criteria. Place a copy of the autotune results in the autotune folder.
- 2) Check and record the pressure in the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
- 3) Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a zero air blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
- 4) Prepare a sample sequence for the Nuteck. The sample sequence should be organized as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within 20% of its assigned value the system must be recalibrated.
- 5) Attach the sample canisters to the Nuteck autosampler ring as per the sequence. Execute the Nuteck sequence.
- 6) Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization prior to analysis. Instrument reports will be in units of ug/m3 and must be corrected for the analysis dilution using the following calculation:

$$(Fp / Ip) \times Ci = Cr$$

Ip = initial canister pressure in mm Hg
Fp = final canister pressure in mm Hg
Ci = concentration from the analysis report in ug/m3
Cr = reported concentration in ug/m3

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five replicate samples of cis-1,3 DCP and trans 1,3 DCP standard at three concentrations (low, mid and high range). Reproducibility study results are presented in Table 1.

B. Linearity

A 6-point calibration was performed on 7/25/2000. Calibrators from 0.036 to 0.953 ug/m3 were used for both isomers and the results were used to calculate calibration curves using linear regression.

$$\text{Response Ratio (cis isomer)} = 7.08\text{e}+001 * \text{Amount} + 9.37\text{e}-002$$
$$R^2 = 0.999$$

$$\text{Response Ratio (trans isomer)} = 4.56\text{e}+001 * \text{Amount} + 5.57\text{e}-002$$
$$R^2 = 0.999$$

C. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spike, the method detection limits (MDL), and the estimated quantitation limits (EQL) for 1,3-DCP isomers are calculated by:

$$\text{MDL} = 3.14 * s$$

$$\text{EQL} = 5 * \text{MDL}$$

where: s = the standard deviation of the response calculated for the seven replicate spikes. Given s = 0.0018 ug/m3 (cis) and s = 0.0026 ug/m3 (trans) for the seven samples each, the MDL and EQL are calculated as follows.

$$\text{MDL(cis)} = 3.14 (0.0018 \text{ ug/m}^3) = 0.0057 \text{ ug/m}^3$$
$$\text{EQL(cis)} = 5(0.0057 \text{ ug/m}^3) = 0.028 \text{ ug/m}^3$$

$$\text{MDL(trans)} = 3.14 (0.0026 \text{ ug/m}^3) = 0.0082 \text{ ug/m}^3$$
$$\text{EQL(trans)} = 5(0.0082 \text{ ug/m}^3) = 0.041 \text{ ug/m}^3$$

Assuming a 1 : 1 : 5 dilution to pressurize ambient samples:

$$\text{EQL(cis)} = 1.5 (0.028 \text{ ug/m}^3) = 0.042 \text{ ug/m}^3$$
$$\text{EQL(trans)} = 1.5 (0.041 \text{ ug/m}^3) = 0.060 \text{ ug/m}^3$$

Results are reported to 3 significant figures above the EQL. Results below EQL and above MDL are reported as det (detected). Results less than MDL are reported as less than MDL.

D. Storage Stability

Conduct a storage stability study of dichloropropene over a 3-week period. Four (4) canisters are spiked with dichloropropene at approximately 1 ppb. The spiked canisters are stored at ambient temperature and analyzed on storage weeks 0, 1, 2, 3. A stability study for dichloropropene is currently being conducted.

E. Safety Precautions

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

DISCUSSION:

Table 1

REPRODUCIBILITY STUDY

Low Level	Cis-1,3- Dichloropropene (ng/m3)	Trans- 1,3- Dichloropropene (ng/m3)
1	48.47	47.90
2	42.51	41.97
3	39.05	43.09
4	38.93	40.30
5	49.49	48.05
Average	43.69	44.26
SD	5.05	3.53
RSD	11.56	7.98
Medium Level		
1	145.90	123.36
2	145.13	123.95
3	143.84	123.68
4	148.41	129.57
5	146.34	128.35
Average	145.92	125.78
SD	1.68	2.94
RSD	1.15	2.34
High Level		
1	933.33	965.97
2	938.40	965.55
3	949.98	972.94
4	933.93	961.24
5	943.24	1,004.36
Average	939.78	974.01
SD	6.96	17.48
RSD	0.74	1.79

Notes:

m3 cubic meters
 ng nanograms
 RSD Relative standard deviation
 SD standard deviation

Appendices

Appendix 1

CAN CLEANING PROCEEDURE

The canister cleaning procedure uses repeated cycling from -30 inches Hg to 30 pounds per square inch gauge with humidified ultra pure nitrogen. Each cycle is 24 minutes (12 minutes vacuum & 12 minutes pressure) at 80 degrees C. The procedure includes eight complete cycles.

Canister data should be logged into the canister cleaning book for each cleaning batch. When the batch is complete one canister is chosen for analysis. The canister is pressurized with ultra pure nitrogen and analyzed by the GCMS method. If target analytes are not less than two times their MDL the entire batch should be cleaned again.

Procedure:

A. Fill dewar with LN2

1. Remove dewar cover.
2. CAREFULLY place hose from LN2 tank into dewar (Orange and silver container behind oven).
3. Open LN2 tank 3 turns
4. Close tank when LN2 can be seen near top of dewar.
5. CAREFULLY remove hose and replace dewar cover.

B. Turn on the vacuum pump.

1. Switch is located on pump to the left of the can oven.

C. Open N₂ Tank

1. Open regulator on N₂ tank to the left of the can oven.

D. Load cans in oven

1. Attach cans to manifold in oven and tighten.
2. If you are cleaning less than 8 cans the unused ports must be capped.
3. Open the can valve

E. Start Timers Located on top left of can oven

1. Push Auto button on top timer and Auto light should come on. If the light is off, hit the button again and it should light.

2. Push the Run button on the bottom timer. The 1 light should light up briefly then switch to 2. On the top timer the 2 light should light.
3. Push the ADV on the top timer. The 2 light should go off and the 1 light should light. The system should also begin to evacuate.
4. Verify the system evacuates all the way by reading the gauge on the back of the oven. The gauge should go to -30 psi.

F. Fill cans and shutdown system.

1. Close all can valves except the ones you want to fill.
2. On the top timer hit the ADV button until the 2 light comes on.
3. Monitor the pressure of the cans on the gauge on the back of the oven.
4. Close can valves when filled.
5. Close N₂ Regulator
6. Turn off Vacuum pump.
7. Remove cans and place plugs on manifold ports.
8. Hit the stop button on both timers.

Appendix 2

Autotune Criteria

A standard autotune should be performed on the detector each day prior to sample analysis. The autotune report should be evaluated for the following:

1. An unusual change in the EM voltage
2. Peak width for all tune masses should be between 0.4 aAmu and 0.6 amu.
3. The relative abundance of tune mass 219.0 should be greater than 30% of tune mass 69.0.
4. Isotope abundance ratio for tune mass 70.0 should be between 0.54% and 1.6 %; isotope abundance ratio for tune mass 220.0 should be between 3.2% and 5.4%.
5. Masses 28 and 18 should be evaluated to check for air leaks in the system.

If autotune criteria are not met the system should be evaluated for problems. After the system problems are corrected the detector should be autotuned prior to sample analysis. Autotune reports should be filed in the instrument autotune folder.

Appendix 3

Calibration Standard Preparation for Bromomethane and Telone

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gases and has the following specifications:

Cylinder No ALM057764
Expiration date 11/17/00
BROMOMETHANE 5.77 PPB/M
CIS 1,3-DICHLOROPROPENE 5.45 PPB/M
TRANS 1,3-DICHLOROPROPENE 5.45 PPB/M

Working analysis standard is prepared by diluting the stock gas using the following procedure.

1. A 6 liter Silco canister is evacuated to -30° Hg.
2. 692 ml of stock gas is transferred to the canister using a gas tight syringe.
3. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter.
4. The canister is pressurized to 29.4 psig with ultra pure nitrogen.

The canister will contain analytes at the following concentrations:

BROMOMETHANE 0.861 ug/m³
CIS 1,3-DICHLOROPROPENE 0.953 ug/m³
TRANS 1,3-DICHLOROPROPENE 0.953 ug/m³

The standard sample injection is 400 ml. A calibration curve is generated by using the cryo sampler to introduce the following volumes of working standard to the GCMS.

<u>Volume</u>	<u>methylbromide</u>	<u>cis 1,3-DCP</u>	<u>trans 1,3-DCP</u>
400 ml	0.861 ug/m ³	0.953 ug/m ³	0.953 ug/m ³
200 ml	0.431 ug/m ³	0.476 ug/m ³	0.476 ug/m ³
100 ml	0.215 ug/m ³	0.238 ug/m ³	0.238 ug/m ³
50 ml	0.108 ug/m ³	0.119 ug/m ³	0.119 ug/m ³
25 ml	0.054 ug/m ³	0.060 ug/m ³	0.060 ug/m ³
15 ml	0.032 ug/m ³	0.036 ug/m ³	0.036 ug/m ³

Attachment III

Standard Operating Procedures for the Analysis of Methyl Bromide in Ambient Air Charcoal Tube Samples

California Dept. of Food and Agriculture
Center for Analytical Chemistry
Environmental Monitoring Section
3292 Meadowview Road
Sacramento, CA 95832
(916) 262-2080 Fax (916) 262-1572

Method # 390
Original Date: 07/30/79
Revised: 03/10/97
Page 1 of 5

Determination of Methyl Bromide Desorbed from Charcoal Tubes

Scope: This method describes the desorption and determination of methyl bromide from charcoal air sample tubes. It is intended solely for the use by the California Department of Food and Agriculture, Chemistry Laboratory Services.

Principle: Methyl bromide (MeBr) in the air that has been absorbed onto activated charcoal is desorbed from the charcoal with ethyl acetate. Subsequently, MeBr is quantified using a gas chromatograph equipped with a HP-5 megabore capillary column and an electron capture detector (ECD).

Reagents, Equipment and Instrument:

Reagents:

1. Ethyl acetate, Fisher, pesticide grade
2. Methyl bromide, analytical grade
3. Charcoal tubes - SKC #226-38-02 SKC West: phone (714) 992-2780

Equipment:

1. Test tubes, 25 mL, with teflon-liner caps
2. Assorted pipettes and micro-syringes
3. Volumetric flasks, 100 mL
4. Small triangular file
5. Thermolyne Vortex Maxi Mixer II
6. Forceps
7. Glass syringe, 5 mL
8. Nylon Acrodisc[®], 0.2 μ m, Gelman.
9. Airchek Sampler, Model 224-PCXR7, with a flow about 15 mL/min

Reagents, Equipment and Instrument: continued*Instrument:*

Hewlett Packard 5390 Series II Gas Chromatograph with autosampler and equipped with an electron capture detector

*Analysis:**Sample Extraction:*

- 1 Remove samples from frozen storage. Allow samples to stand at room temperature for 20-30 minutes before starting extraction of methyl bromide.
- 2 Fold a sheet of white paper into quarters, reopen and place under the test tube to catch spills.
- 3 Pipette a known volume of ethyl acetate into a labeled test tube. A volume of 10 mL for tube A and 5 mL for tube B is suggested.
- 4 Remove caps from a charcoal sample tube. Score the tube with a file just above the spring wire and break the glass tube.
- 5 With a forceps, immediately remove the spring wire only and place it in the test tube.
- 6 Placing the large broken end of the charcoal tube in the mouth of the test tube containing a known volume of ethyl acetate, insert a Pasteur pipette from the opposite end and push the glass wool and charcoal into the test tube. Immediately cap the test tube.
- 7 Extract MeBr from charcoal by mixing for 30 seconds using a vortex mixer.
- 8 Allow the mixture to stand for 3-5 minutes. Filter 1.5 -2 mL of the mixture through a Nylon Acrodisc and collect the solution in an autosampler vial. Store the remaining sample in a freezer.
9. Determine methyl bromide using a glc method.
10. If the peak height of the sample is greater than that of the highest standard, dilute the extract and rerun the standards and the filtered dilute extract.
11. Blank. Score a charcoal tube (A) with a file just above the spring wire and break the glass tube. Next score the tip of the opposite end of the same tube and break the tube at the end.
12. Follow steps 5-9 above.

Analysis:*Sample Extraction:* continued

- 13 Spike Turn the Airchek Sampler to ON Score a charcoal tube (A) with a file in a similar manner as the Blank Place the broken tip of the charcoal tube onto the Airchek Sampler Place a micro-syringe needle about 1 cm below the glass wool and slowly add a known amount of methyl bromide onto the charcoal
- 14 After 10-20 seconds, follow steps 5-9 above.

Instrument Conditions:

Hewlett Packard 5890 Series II GC equipped with ECD
 Column: HP-5 (5% phenyl-methyl polysiloxane) 30 m x 0.537 mm x 2.65 μ m
 Carrier gas: helium; Flow rate: 17 mL / minute
 Injector: 220 °C splitless
 Detector: 320 °C
 Septum purge: 2 mL / minute
 Temperature Program: Initial Temp: 50 °C held for 2 minutes
 Rate: 70 °C / minute
 Final Temp: 210 °C held for 0.5 minute
 Injection volume: 3 μ L
 Retention time of MeBr: 1.1 \pm 0.1 minute

Calculations:

Calculate the amount of MeBr present in a charcoal sample tube as follows:

- 1) without dilution

$$\mu\text{g MeBr} = \frac{(\text{peak ht sample}) (\text{ng std injected}) (\text{sample final volume, mL})}{(\text{peak ht standard}) (\mu\text{L injected})}$$

- 2) with dilution

$$\mu\text{g MeBr} = \frac{(\text{peak ht sample}) (\text{ng std injected}) (\text{sample final volume, mL})}{(\text{peak ht standard}) (\mu\text{L injected})} \times \text{dilution factor}$$

Method Performance:**Minimum Detection Limit:**

The minimum detectable level was 0.2 μg at a S/N = 4

Validation:

Charcoal tubes were spiked at two levels of MeBr, 1 and 20 μg . Spiked samples were extracted with ethyl acetate and the amount of MeBr in the extract was subsequently determined.

Recoveries of methyl bromide are:

Spike levels	% Recovery	Ave	SD	CV
1 μg	86.2	85.7	3.83	4.47
	89.2			
	81.6			
20 μg	82.2	83.9	1.99	2.38
	83.2			
	86.1			

Discussion:

High humidity may affect trapping efficiency. When the amount of water in the air is so large that condensation actually occurs in the tube, organic vapors will not be trapped efficiently. Experiments using toluene indicate that high humidity severely decreases the breakthrough volume (2).

Check each bottle of ethyl acetate on the GC for any interfering peaks before using for extracting samples. Any bottle of ethyl acetate found to contain interfering peaks is unsuitable for use in this work.

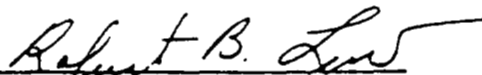
Methyl bromide is highly volatile. Consequently on extraction of MeBr, test tubes must be tightly capped. **Do Not Use Caps Without A Teflon Liner.**

Each analytical run contained standards ranging from approximately 0.04 to 2 $\mu\text{g/mL}$ (eg. 0.04, 0.08, 0.16, 0.32, 0.64 and 1.2 $\mu\text{g/mL}$). This range of 5-6 standards was run after every ten samples

References:

- 1 *NIOSH Manual of Analytical Methods, Second Edition Method S372*. Available from Superintendent of Documents, US Government Printing Office, Washington, DC, 20402
- 2 Fredrickson, Scott A. *Determination of EDB on Charcoal Tubes*, 1979, Worker and Safety Methods, California Department of Food and Agriculture, Chemistry Laboratory Services, 3292 Meadowview Road, Sacramento, California 95832.
- 3 Malone, B., *Analysis of Grains for Multiple Residues of Organic Fumigants*. AOAC, 52, p 800, 1969
- 4 Clower, M., *Modification of the AOAC Method for Fumigants in Wheat*, FDA Laboratory Information Bulletin #2169, August, 1978.
- 5 Fredrickson, Scott A., private communication, CDFA Work Health and Safety, Chemistry Laboratory Services.

UPDATED BY: Robert B. Lew


TITLE: Agricultural Chemist I

ADAPTED BY: Paul Lee


TITLE: Agricultural Chemist III

APPROVED BY: Catherine Cooper


TITLE: Agricultural Chemist III, Supervisor

Attachment IV

Standard Operating Procedures for the Sampling and Analysis of 1,3-dichloropropene (Telone) in Ambient Air Charcoal Tube Samples

California Environmental Protection Agency



Air Resources Board

**Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division**

**Draft
Standard Operating Procedure
Sampling and Analysis of 1,3-dichloropropene (Telone)
in Ambient Air using Gas Chromatography/Mass
Selective Detector**

07/10/00 version

Approved by:

1. SCOPE

The current method is modified from the previous procedure (1994) using a gas chromatograph/mass selective detector for the determination of 1,3- dichloropropene (Telone) from ambient air samples. In addition the method uses dichloromethane (DCM) as the extraction solvent.

2. SUMMARY OF METHOD

Coconut based charcoal tubes are placed on the sampler for 24 hours at 3.0 liters per minute (LPM) flow rate. The samples are stored in an ice chest or refrigerator until extracted with 3 ml of dichloromethane (DCM). The injection volume is 1 μ l. A gas chromatograph with a mass selective detector in the selected ion monitoring (SIM) mode is used for analysis.

3. INTERFERENCES/LIMITATIONS

Method interferences may be caused by contaminants in solvents, reagents, glassware and other processing apparatus that can lead to discrete artifacts or elevated baselines. A method blank must be done with each batch of samples to detect any possible method interferences.

4. EQUIPMENT AND CONDITIONS

A. INSTRUMENTATION:

Hewlett-Packard 6890 Series gas chromatograph
Hewlett-Packard 5973 Network mass selective detector

MS Transfer line: 280° C

Injector: 200 °C, Splitless, Liner 4 mm straight liner with glass wool.

Column: J&W Scientific DB-VRX, 60 meter, 250 μ m i.d., 1.4 μ m film thickness.

GC Temperature Program: Oven initial 40 °C, hold 4 min. Ramp to 220 °C @ 12 °C/min., hold 1 min. Retention time: cis-DCP= 11.63 min., trans-DCP= 12.10 min.

Splitter open @ 1.0 min.

Flows: Column: He, 2.0 ml/min, 30 psi. (velocity: 37 cm/sec)

Splitter: 50 ml/min.

Mass Spectrometer: Electron Ionization

Selective Ion Monitoring: dichloropropene, 75 (quant. ion 100%), 110 (qual. ion 20%) Tuning: PFTBA on masses 69, 219, 502.

B. Auxiliary Apparatus

1. Precleaned vials, 8 ml capacity with teflon caps.
2. Whatman filters, 0.45 μ m
3. Disposable syringes, 3 ml
4. Sonicator
5. GC vials with septum caps.

C. Reagents

1. Dichloromethane, Pesticide grade or better.
2. 1,3 -Dichloropropene (cis- and trans- mixture), Chem Service PS- 1 52, 99 (+) % or equiv.
3. Coconut charcoal sorbent tubes, SKC, Fullerton, CA #226-09.

5. ANALYSIS OF SAMPLES

1. A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses: 69,219,502. The criterion for the tune are the peak widths at $\frac{1}{2}$ the peak height, 0.60 ± 0.05 , and the criteria for relative abundance: 69:100%, 219:100-120%, and 502: 7-12%.
2. It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interference's. A solvent blank must be analyzed after any sample which results in possible carry-over contamination.
3. A 5-point calibration curve shall be analyzed with each batch of samples
4. With each batch of samples analyzed a laboratory blank and a laboratory control spike will be run concurrently. A laboratory blank is charcoal prepared and analyzed the same way the samples are analyzed. A laboratory control spike is charcoal spiked with a known amount of standard. The control sample is prepared and analyzed the same way as the samples. Laboratory check samples should have recoveries that are at least 70% of the theoretical spiked value.
5. A calibration check sample of 15 ng/ml is run after the calibration and every 10 samples and at the end. The value of the check must be within $\pm 3\sigma$ (the standard deviation) or $\pm 10\%$ of the expected value. If the calibration check is

outside the limit then those samples in the batch after the last calibration check that was within the limit need to be reanalyzed.

6. Score and snap the sample tube, transfer the charcoal into a 8 ml vial. (Save the back-up bed for future analysis if necessary.) Rinse the tube with 3.0 ml of DCM into the extraction vial. Cap and place the vial in the sonicator for 1 hour.
7. Filter the samples using a 3 ml syringe and 0.45 μm filter directly into a gc vial and cap securely.
8. The atmospheric concentration is calculated according to:

$$\text{Conc (ng/m}^3\text{)} = (\text{Extract Conc (ng/m}^3\text{)} \times 3 \text{ ml} / \text{Air Volume Sampled, (m}^3\text{)})$$

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five (5) 1.0 μl of dichloropropene standard at three concentrations (low, mid, and high range). Table 1 shows the instrument reproducibility for 10 ng/ml, 40 ng/ml and 100 ng/ml with the average and standard deviation of the determined value and the area response.

B. Calibration

A five-point calibration curve was made ranging from 10.0 ng/ml to 100 ng/ml. The regression is linear over this range with $r^2 = 0.999$.

C. Calibration Check

A calibration check sample is run after the calibration and then every 10 samples and at the end to verify the system is in calibration. The value of the check must be within $\pm 3\sigma$ (the standard deviation) or $\pm 10\%$ of the expected value. If the calibration check is outside the limit then those samples in the batch after the last calibration check that was within the limit need to be reanalyzed.

D. Minimum Detection Limit

Detection limits is based on US EPA MDL calculation. Using the analysis of seven (7) replicates of a low-level matrix spike, the method detection limit (MDL) and the estimated quantitation limit (EQL) for 1,3-dichloropropene is calculated by: $\text{MDL} = 3.14 \times (\text{std dev values})$ where std dev = the standard deviation of the

concentration calculated for the seven replicate spikes. For dichloropropene, the MDL is 2.0 ng/sample. EQL defined as 5*MDL is 10 ng/sample based on a 3 ml extraction volume. Results are reported to 3 significant figures above the EQL. Results below EQL are reported as DET (detected) and results less than the MDL are ND (nondetect).

E. Collection and Extraction Efficiency (Recovery)

Dichloropropene at a low and high level are spiked on charcoal tubes (3 at each concentration). The spiked tubes are placed on field samplers with airflows of 3 lpm for 24 hours. The samples are extracted with DCM and prepared as described in section 5 #6-7. The average percent recovery of dichloropropene should be $\pm 20\%$ of the expected value. The recoveries both for the low and high levels are greater than 90%.

F. Storage Stability

Storage stability studies were completed in the previous analysis and not continued further here. All analyzes were completed within 2 days of receipt.

G. Breakthrough

No breakthrough analysis was done with this monitoring, the previous method had completed this.

H. Safety

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure.

Table 1: Instrument Reproducibility

Standard is 48% cis and 49% trans isomers.

Amount (ng/ml)	Cis	ng/ml	Trans	ng/ml
	Area response		Area response	
10 (4.8/4.9)	684	4.72	628	4.74
	672	4.62	629	4.75
	681	4.69	681	5.17
	680	4.68	692	5.26
	684	4.72	669	5.08
Average	680	4.69	660	5.00
Standard Dev.	4.9	0.04	29.7	0.24
40 (19.2/19.6)	2584	19.06	2472	19.69
	2599	19.18	2431	19.36
	2535	18.69	2394	19.06
	2530	18.66	2396	19.08
	2528	18.64	2405	19.15
Average	2555	18.85	2420	19.27
Standard Dev.	33.7	0.25	32.8	0.26
100 (48.0/49.0)	6559	49.08	6282	50.58
	6581	49.25	6217	50.05
	6582	49.26	6292	50.66
	6604	49.42	6294	50.68
	6558	48.72	6284	49.77
Average	6577	49.15	6274	50.5
Standard Dev.	19.1	0.27	32.2	0.41

Attachment V

Canister Field Log Sheet and
Canister Field Data Sheet

Project C-00-028
Ambient Monitoring for MeBr/Telone

Project C-00-028

Ambient Monitoring for MeBr/Telone

[illegible]

PESTICIDES**CALIFORNIA AIR RESOURCES BOARD
MeBr/Telone Data Sheet**

Site Name: _____

Station Operator: _____ Sampling Start Date: _____

CANISTER ID #:

	Date	Time (PST)	Vacuum (*Hg)	MFM Reading
Lab-pre*				
Sample Start				
Sample Stop				
Lab-post*				

*Calibrated Gauge Pressure

SAMPLE TYPE: ☐ Regular ☐ Collocated ☐ Episode ☐ Other:

SAMPLER ID NUMBER: _____ SHIP DATE TO LAB: _____ SHIPPED BY: _____

SHIP TIME: _____

SAMPLING CONDITIONS:

- ☐ No unusual conditions
☐ Construction nearby
☐ Farm operations nearby
☐ Fire nearby
☐ Rain
☐ Wind-blown sand/dust
☐ Other: _____

FLAGGED SAMPLE? ☐ NO or ☐ YES

Reason for sample flag (Valid vacuum range -5.0 to -10 inHg)

- ☐ Low canister pressure
☐ High canister pressure

☐ Sampling equipment inoperative
☐ Damaged sampling media
☐ Other reasons: _____

FIELD COMMENTS:

FOR LABORATORY USE

Shipped to field by:	Date:	Time:	Received in lab by:	Date:	Time:
Custody Seal Intact: Yes _____ No _____ (If No: comment)			LAB COMMENTS:		
SAMPLE ID:					

APPENDIX II

CANISTER SAMPLE LABORATORY REPORT

California Environmental Protection Agency

Air Resources Board

1,3-Dichloropropene and Bromomethane Method Development and Analytical Results for Ambient Air Monitoring Samples collected in 6 liter Silco™ Canisters in Monterey County

DATE: December 2000

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Project Number: C00-028

This report has been reviewed by staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names of commercial products constitute endorsement or recommendation for use.

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1.0 INTRODUCTION

The Department of Pesticide Regulation (DPR) requested the Air Resources Board (ARB) to conduct ambient air monitoring for 1,3-dichloropropene and bromomethane using six liter Silco™ canisters for sample collection. 1,3-Dichloropropene is a mixture of two isomers, cis-1,3-dichloropropene and trans-1,3-dichloropropene, and both isomers are quantified separately in this report. ARB staff analyzed ambient air samples collected during a eight-week period at six Monterey County monitoring sites. This report covers the analytical and quality assurance results for this ambient air-monitoring program. Standard operating procedures (SOP's) for 1,3-dichloropropene and bromomethane are attached as Appendices 1 and 2.

2.0 METHOD DEVELOPMENT AND STANDARD OPERATING PROCEDURE

2.1 Overview

The method follows U. S. Environmental Protection Agency (USEPA) Compendium Method TO-14A. Each field sample is pressurized to approximately 5 pounds per square inch gauge (psig) before sample analysis. The canisters are concentrated using a Nutech cryogenic autosampler/concentrator (cryosampler) and then loaded onto the capillary column. The cryosampler contains a Nafion dryer, which reduces water vapor in the sample stream. A gas chromatograph equipped with a high-resolution capillary column separates the sample components. A linear quadrapole mass spectrometer operated in selected ion monitoring (SIM) mode detects the sample components. The results of the analysis are calculated using an internal standard (IS) method with separate internal standards for both bromomethane and 1,3-dichloropropene

2.2 Instrument Reproducibility

In order to establish the reproducibility of this method, lab staff made three concentration standard mixtures of 1,3-dichloropropene and bromomethane. Lab staff analyzed each standard concentration five times using a 400-milliliter (ml) sample size. Table 1 shows the instrument reproducibility results for 1,3-dichloropropene and bromomethane.

2.3 Calibration

The gas chromatograph is calibrated by an internal standard (IS) method. A calibration curve is constructed by linear regression analysis of calibrator to IS response ratios. The high point of the calibration is determined by sampling 400 ml of a canister containing the high point concentration. Subsequent calibration points are determined by injecting smaller amounts from the high calibrator canister. The subsequent calibration points volumes are 200, 100, 50, 25 and 15 ml. Calibration curves used for the current study had a r^2 value (variance) greater than 0.995. The instrument is recalibrated whenever the continuing calibration check is not within 20% of it's target value or the Laboratory Control Sample (LCS) is not within range.

2.4. Minimum Detection Limit (MDL)

The method follows standard United States Environmental Protection Agency (USEPA) procedures to calculate the MDL. Using the analysis of seven low level matrix spikes (40ng/m³), the MDL and EQL for a 400 ml sample are calculated as follows:

s = the standard deviation of the concentration calculated for the seven replicate spikes.

For bromomethane: $s = 1.5 \text{ ng/m}^3$

$\text{MDL} = (3.14) * (s) = (3.14) * (1.5) = 4.7 \text{ ng/m}^3$

$\text{EQL} = (5) * (\text{MDL}) = (5) * (4.7) = 24 \text{ ng/m}^3$

Assume 1:1.5 dilution for pressurization of sample; $\text{EQL} = 24 \text{ ng/m}^3 * 1.5 = 36 \text{ ng/m}^3$

For cis-1,3-dichloropropene: $s = 1.8 \text{ ng/m}^3$

$\text{MDL} = (3.14) * (s) = (3.14) * (1.8) = 5.7 \text{ ng/m}^3$

$\text{EQL} = (5) * (\text{MDL}) = (5) * (5.7) = 28 \text{ ng/m}^3$

Assume 1:1.5 dilution for pressurization of sample; $\text{EQL} = 28 \text{ ng/m}^3 * 1.5 = 42 \text{ ng/m}^3$

For trans-1,3-dichloropropene: $s = 2.6 \text{ ng/m}^3$

$\text{MDL} = (3.14) * (s) = (3.14) * (2.6) = 8.2 \text{ ng/m}^3$

$\text{EQL} = (5) * (\text{MDL}) = (5) * (8.2) = 41 \text{ ng/m}^3$

Assume 1:1.5 dilution for pressurization of sample; $\text{EQL} = 41 \text{ ng/m}^3 * 1.5 = 60 \text{ ng/m}^3$

For results above the EQL the lab reports these values to three (3) significant figures. For results below the EQL but greater than or equal to the MDL the lab reports these values as detected (DET). If a result is less than MDL it is reported as <MDL.

The requested EQL's for bromomethane and dichloropropene were 0.4 and 0.01 $\mu\text{g/m}^3$ respectively. Based on a 400 ml sample size the EQL's achieved were 0.036 $\mu\text{g/m}^3$ for bromomethane, 0.042 $\mu\text{g/m}^3$ for cis-1,3-dichloropropene and 0.060 $\mu\text{g/m}^3$ for trans-1,3-dichloropropene. The maximum sample size was set at 400 ml based on the increased probability of matrix interference from high levels of sample moisture and matrix. The HP5973 was run using selected ion monitoring mode to achieve the highest level of instrument sensitivity. Given the sample size and instrument parameters the EQL's reported are the best that could be achieved.

2.5. Collection Efficiency (Recovery)

Eight (8) canisters were used to determine method recovery. Lab staff spiked four (4) canisters with standard at a level equivalent to the low range method calibration. Lab staff spiked an additional four (4) canisters with standard at a level equivalent to high range method calibration. Using standard method sampling conditions lab staff introduced ambient air into the canisters. Sampling was performed on the sampling platform at ARB 13th & T Sacramento. Lab staff then analyzed the canisters and compared the results to the theoretical (expected) values. See Table 3 for comparison results.

2.6. *Storage Stability*

Lab staff spiked four (4) canisters with standard at a mid-calibration range and held the canisters under laboratory conditions until analysis. Analysis of the spiked canisters occurred at day 0, 5, 13, and 31. Standard compound stability was evaluated by comparing the ratio of the compound to the area of it's internal standard. See Table 4 for sample stability results.

2.7 *Canister Cleaning*

Canisters are cleaned in batches of eight (8). Lab staff chooses one of the cleaned canisters for GCMS analysis. Normally, lab staff analyzes the canister with the highest level of target compound. If analysis results for target compounds are not below method MDL the entire cleaning batch is recleaned. Appendix 3 contains the standard operating procedure for canister cleaning.

3.0 **AMBIENT AIR MONITORING SAMPLE RESULTS**

The laboratory received 246 ambient air samples from Monterey County, including four (4) trip blanks. Four (4) trip spikes, four (4) field spikes and four (4) lab spikes were prepared and analyzed. Sample analysis occurred within twelve (12) days of receipt. Table 2 presents the results of the analysis of the bromomethane and 1,3-dichloropropene in ambient air samples. Results for samples run, as laboratory duplicates, are not averaged and are not reported in Table 2. Note: Table 2 presents only the original sample injection results.

Because the concentration of field samples was higher than anticipated, many of the ambient air samples required dilution. Lab staff diluted samples by injecting a volume less than 400 ml. Dilution results were multiplied by the volume ratio (400 ml/volume injected) to calculate the actual concentration. The sample concentrator cannot accurately deliver volumes less than 10 ml, so samples requiring dilutions greater than 40 times were diluted manually. Manual dilutions involved adding a known volume of ambient air sample to a clean evacuated canister and pressurizing the canister with ultrapure nitrogen. The ideal gas law was used to calculate manual dilution factors.

Of the 246 samples analyzed all but, six samples were run using 400 mls of sample. Analysis of SES-02 used 50 mls. Analysis of SAL-02, and LJE-03 used 75 mls. Analysis of SAL-03, SAL-03D, and SES-01 used 100mls. These samples had elevated levels of methyl bromide requiring dilution, but telone levels were below MDL. These samples were not rerun at a higher volume to verify that Telone was below the method detection limits. These samples are footnoted in Table 2. The adjusted MDL values are reported in the footnotes following Table 2.

4.0 ANALYTICAL QUALITY CONTROL

4.1 Laboratory System Blanks

A laboratory system blank is the analysis of 400 ml of ultrapure nitrogen. The system blank checks the analytical system for contamination. Before an analytical batch run, lab staff analyzes a system blank. Lab staff defines an analytical batch as the samples in an automated GC/MS analysis sequence. Lab staff performed an analysis of a system blank after every tenth sample and at the end of each analytical batch. All system blank results were less than the MDL.

4.2 Method Calibration

The analytical method uses a certified gas standard for calibration. Prior to analysis, autotune the detector and evaluate autotune results with the criteria listed in Appendix 4. The certified standard used for the current project was obtained from Scott Specialty Gases and has the following specifications: bromomethane 5.77 ppb, cis-1,3-dichloropropene 5.45 ppb, trans-1,3-dichloropropene 5.30 ppb, analytical accuracy +/- 20%, Cylinder # ALM057764, Expiration Date 11/17/00. Lab staff calibrate the instrument by diluting the stock standard to produce the calibration curve detailed in Appendix 5.

Method calibration uses an internal standard method. The stock internal standard used for the current project was obtained from Scott-Marrin Inc. and has the following specifications: 1,2 dichloropropane-d6 109.3 +/- 7.7 ppb, bromomethane-d3 102.6 +/- 7.2 ppb. Working internal standard is prepared by adding 900 ml of the stock standard to a 6 liter canister and pressurizing the canister to 29.4 psig with ultrapure nitrogen. The cryosampler adds internal standard to the analytical system using a fixed volume sample loop. Recalibration of the analytical system occurs with each new batch of working internal standard.

4.3 Laboratory Control Spikes

Analysis of a laboratory control spike (LCS) occurs with each analytical batch. The stock standard for LCS preparation should not be the same stock standard used to calibrate the instrument. The LCS is prepared by spiking the stock standard into a six-liter canister and diluting to a specific concentration with ultrapure nitrogen. Analysis of 400 ml of the LCS occurs as described for the field samples. Lab staff used the following acceptance criteria to evaluate the LCS: warning limit = sample mean +/- 2 standard deviations; control limit = sample mean +/- 3 standard deviations. Acceptance ranges used for the current project are: bromomethane, mean = 522 ng/m³, standard deviation 35.5 ng/m³, range 415-629 ng/m³; cis-1,3-dichloropropene, mean 301 ng/m³, standard deviation 33.2 ng/m³, range 202-400 ng/m³; trans-1,3-dichloropropene, mean 442 ng/m³, standard deviation 69.2 ng/m³, range 264-620 ng/m³. All results were within the acceptance criteria. Results of the LCS analyses are reported in Table 5.

4.4 *Continuing Calibration Verification Standard*

Lab staff includes a continuing calibration verification standard (CCV) at the beginning of each analytical batch and after every tenth sample in an analytical sequence. The CCV must be within $\pm 20\%$ of the expected value. If the CCV is outside the $\pm 20\%$ limit, reanalysis of the affected samples occurs. If the CCV is outside of limits, lab staff take appropriate corrective action and then reanalyzes the CCV. Recalibration of the entire system occurs if this reanalysis is outside of limits.

4.5 *Laboratory Duplicate Samples*

Lab staff run at a minimum 10% of the ambient air samples as duplicates. Results of these duplicate analyses are reported in Table 8.

5.0 **AMBIENT AIR FIELD, TRIP, LABORATORY SPIKES AND TRIP BLANKS**

Four (4) laboratory spikes, four (4) trip spikes, four (4) field spikes and four (4) trip blanks were analyzed during the Monterey County ambient air program. A set of canisters was spiked approximately every two weeks for the duration of the monitoring program. The lab staff held the lab spikes in the laboratory and analyzed them with their corresponding field spike and trip spike.

5.1 *Laboratory spikes*

Four (4) canisters were spiked and stored at ambient temperature in the laboratory. Table 6 presents the laboratory spike results. The average recovery was: bromomethane 101%, cis-1,3-dichloropropene 91% and trans-1,3-dichloropropene 90%.

5.2 *Trip spikes*

Four (4) canisters were spiked and taken into the field along with the field sample canisters. The trip spike accompanies field staff to the field and is then return to the laboratory. Trip spikes do not undergo field sampling. Table 6 presents the trip spike results. The average recovery was: bromomethane 102%, cis-1,3-dichloropropene 88% and trans-1,3-dichloropropene 88%.

5.3 *Field spikes*

Four (4) canisters were spiked and taken into the field along with the field sample canisters. Sampling of the field spikes occurred at the ARB Salinas monitoring site. Introduction of ambient air into the spiked canisters follows the ambient air sampling protocol. Table 6 presents the field spike results. The amount of the compounds reported for the collocated ARB site sample was not subtracted from the spike results. The average recovery was: bromomethane 797%, cis-1,3-dichloropropene 110% and trans-1,3-dichloropropene 112%.

5.4 *Trip blanks*

The lab received four trip blank canisters. A trip blank is a 6-liter canister, which has been evacuated to minus 30 inches of mercury. Trip blank canisters accompany field staff through the sampling process. Field staff return trip blanks to the lab for analysis. The canisters are pressurized to approximately 5 psig with ultrapure nitrogen and analyzed. Table 7 presents the trip blank results.

6.0 DISCUSSION

Ambient air field spike results (Table 6) from Monterey County show bromomethane recovery results that are much higher than expected. As noted, collection of the field spike samples occurred at the ARB monitoring site in Salinas. Field spike recovery results from Sacramento (Table 3) show results close to the expected results. It seems reasonable to conclude that the high recovery results for the field spikes are actual Salinas background levels rather than some method anomaly.

Evaluation of the canister stability data in Table 4 indicates that method analytes are stable under laboratory conditions for at least 31 days. Area ratios were chosen to evaluate the canister stability data because method calibration was changed several times during the duration of the stability study.

The trip and field spike results for 10/20/00 (#3) are lower than expected. The laboratory spike results for 10/20/00 are close to the expected results. All 10/20/00 spikes were prepared from the calibration stock gas using identical preparation technique. Recovery differences between field and lab spikes could be the result of preparation errors or exposure to unusual field conditions.

A large percentage of the field samples required dilution before analysis. Analytical results show a large variation in the analyte concentrations in the field samples. The method calibration ranges are optimized using the estimated quantitation limits requested by DPR. It would be preferable from both an analytical and logistical point not to dilute the samples. The wide range of sample concentrations makes dilution necessary to maintain method sensitivity.

Table 1: Instrument Reproducibility

	Methyl Bromide (ng/m3)	Cis-1,3- Dichloropropene (ng/m3)	Trans- 1,3- Dichloropropene (ng/m3)
Low Level			
1	48.59	48.47	47.90
2	47.48	42.51	41.97
3	49.49	39.05	43.09
4	47.77	38.93	40.30
5	46.06	49.49	48.05
Average	47.88	43.69	44.26
SD	1.283	5.05	3.53
RSD	2.68	11.56	7.98
Medium Level			
1	168.51	145.90	123.36
2	175.56	145.13	123.95
3	170.05	143.84	123.68
4	170.32	148.41	129.57
5	166.02	146.34	128.35
Average	170.09	145.92	125.78
SD	3.50	1.68	2.94
RSD	2.06	1.15	2.34
High Level			
1	859.54	933.33	965.97
2	873.08	938.40	965.55
3	858.87	949.98	972.94
4	841.56	933.93	961.24
5	852.66	943.24	1,004.36
Average	857.14	939.78	974.01
SD	11.46	6.96	17.48
RSD	1.34	0.74	1.79

Notes:

m3 Cubic meters
ng Nanograms
RSD Relative standard deviation
SD Standard deviation

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
CHU	CHU-01	4	9/13/00	9/14/00	2.58E+03	1.43E+03	8.42E+02
	CHU-02	11	9/15/00	9/15/00	3.13E+03	2.70E+03	1.64E+03
	CHU-03	20	9/15/00	9/15/00	3.66E+03	8.46E+02	8.57E+02
	CHU-03D	21	9/15/00	9/15/00	3.41E+03	7.44E+02	7.37E+02
	CHU-04	29	9/18/00	9/27/00	1.93E+03	<MDL	<MDL
	CHU-05	36	9/21/00	9/27/00	2.27E+03	4.06E+02	4.10E+02
	CHU-06	42	9/21/00	9/29/00	8.36E+03	3.00E+02	3.15E+02
	CHU-07	50	9/25/00	9/29/00	6.31E+03	<MDL	<MDL
	CHU-07D	51	9/25/00	9/29/00	2.75E+03	<MDL	<MDL
	CHU-08	60	9/25/00	10/3/00	3.27E+03	DET	DET
	CHU-09	66	9/28/00	10/3/00	4.66E+02	<MDL	<MDL
	CHU-10	74	9/28/00	10/5/00	1.25E+03	<MDL	<MDL
	CHU-10D	75	9/28/00	10/5/00	1.28E+03	<MDL	<MDL
	CHU-11	84	10/2/00	10/6/00	8.92E+02	<MDL	<MDL
	CHU-12	91	10/2/00	10/6/00	2.62E+03	<MDL	<MDL
	CHU-13	97	10/5/00	10/6/00	1.43E+03	<MDL	<MDL
	CHU-14	104	10/5/00	10/11/00	1.20E+03	<MDL	<MDL
	CHU-14D	105	10/5/00	10/11/00	1.19E+03	<MDL	<MDL
	CHU-15	115	10/10/00	10/13/00	2.36E+03	<MDL	<MDL
	CHU-16	121	10/10/00	10/13/00	1.18E+03	<MDL	<MDL
	CHU-17	128	10/16/00	10/16/00	2.86E+02	<MDL	<MDL
	CHU-18	136	10/16/00	10/18/00	1.48E+03	<MDL	<MDL
	CHU-18D	137	10/16/00	10/17/00	1.94E+02	<MDL	<MDL
	CHU-19	146	10/16/00	10/17/00	1.29E+03	<MDL	<MDL
	CHU-20	155	10/19/00	10/23/00	9.36E+03	4.55E+01	DET
	CHU-21	164	10/19/00	10/26/00	4.96E+03	2.88E+02	2.02E+02
	CHU-21D	165	10/19/00	10/26/00	5.00E+03	2.87E+02	2.10E+02
	CHU-22	172	10/20/00	10/25/00	4.68E+03	5.27E+02	4.48E+02
	CHU-23	179	10/20/00	10/27/00	5.98E+03	1.68E+02	2.45E+02
	CHU-24	186	10/26/00	10/30/00	4.41E+03	DET	DET
	CHU-25	192	10/26/00	10/30/00	2.21E+03	<MDL	<MDL
	CHU-26	200	10/27/00	10/31/00	1.16E+03	8.13E+01	DET
	CHU-26D	201	10/27/00	10/31/00	1.15E+03	8.52E+01	DET
	CHU-27	210	10/27/00	11/1/00	1.32E+03	<MDL	<MDL
	CHU-28	216	11/1/00	11/2/00	4.40E+02	<MDL	<MDL
	CHU-29	222	11/3/00	11/6/00	4.37E+02	<MDL	DET
	CHU-30	230	11/3/00	11/6/00	3.33E+02	<MDL	<MDL
	CHU-30D	231	11/3/00	11/7/00	3.22E+02	<MDL	<MDL
	CHU-31	241	11/3/00	11/7/00	4.21E+02	4.16E+02	1.34E+02

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
LJE	LJE-01	5	9/13/00	9/14/00	2.16E+04	<MDL	<MDL
	LJE-02	12	9/15/00	9/25/00	9.33E+04	<MDL	<MDL
	LJE-03	22	9/15/00	9/25/00	2.84E+04	<MDL [†]	<MDL [†]
	LJE-03D	23	9/15/00	9/27/00	3.26E+04	3.67E+02	1.98E+02
	LJE-04	30	9/18/00	9/27/00	1.75E+04	<MDL	<MDL
	LJE-05	37	9/21/00	9/28/00	4.30E+04	<MDL	<MDL
	LJE-06	43	9/21/00	9/29/00	4.60E+04	<MDL	<MDL
	LJE-07	52	9/25/00	10/2/00	6.10E+03	<MDL	<MDL
	LJE-07D	53	9/25/00	10/2/00	9.63E+03	<MDL	<MDL
	LJE-08	61	9/21/00	10/3/00	NA	NA	NA
	LJE-09	67	9/28/00	10/3/00	1.17E+03	<MDL	<MDL
	LJE-10	76	9/28/00	10/5/00	2.31E+03	<MDL	<MDL
	LJE-10D	77	9/28/00	10/5/00	3.08E+03	<MDL	<MDL
	LJE-11	85	10/2/00	10/6/00	1.04E+03	<MDL	<MDL
	LJE-12	92	10/2/00	10/6/00	1.44E+04	<MDL	<MDL
	LJE-13	98	10/5/00	10/6/00	7.61E+02	<MDL	<MDL
	LJE-14	106	10/5/00	10/11/00	4.76E+02	<MDL	<MDL
	LJE-14D	107	10/5/00	10/11/00	4.84E+02	<MDL	<MDL
	LJE-15	116	10/10/00	10/13/00	1.65E+04	<MDL	<MDL
	LJE-16	122	10/10/00	10/16/00	3.13E+03	<MDL	<MDL
	LJE-17	129	10/16/00	10/17/00	2.67E+03	<MDL	<MDL
	LJE-18	138	10/16/00	10/17/00	2.40E+03	<MDL	<MDL
	LJE-18D	139	10/16/00	10/17/00	9.61E+02	<MDL	<MDL
	LJE-19	147	10/16/00	10/19/00	4.64E+03	<MDL	<MDL
	LJE-19D	148	10/16/00	10/19/00	4.39E+03	<MDL	<MDL
	LJE-20	156	10/19/00	10/23/00	4.17E+04	DET	DET
	LJE-20D	157	10/19/00	10/23/00	5.11E+04	DET	DET
	LJE-21	166	10/19/00	10/26/00	8.27E+03	5.66E+01	DET
	LJE-22	173	10/20/00	10/25/00	1.37E+04	<MDL	<MDL
	LJE-23	180	10/20/00	10/30/00	1.43E+04	DET	DET
	LJE-24	187	10/26/00	10/30/00	2.73E+04	DET	DET
	LJE-25	193	10/26/00	10/30/00	4.85E+03	<MDL	<MDL
	LJE-26	202	10/27/00	11/1/00	2.98E+03	7.13E+01	DET
	LJE-26D	203	10/27/00	11/1/00	3.06E+03	6.66E+01	DET
	LJE-27	211	10/27/00	11/2/00	4.87E+03	<MDL	<MDL
	LJE-28	217	11/1/00	11/2/00	7.61E+02	<MDL	<MDL
	LJE-29	223	11/3/00	11/6/00	1.22E+03	<MDL	<MDL
	LJE-30	232	11/3/00	11/6/00	7.92E+02	<MDL	<MDL
	LJE-30D	233	11/3/00	11/6/00	7.83E+02	<MDL	<MDL
	LJE-31	242	11/3/00	11/7/00	1.15E+03	4.75E+01	DET

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
OAS	OAS-01	3	9/13/00	9/13/00	1.22E+03	1.60E+02	1.20E+02
	OAS-02	9	9/15/00	9/25/00	2.62E+03	3.50E+02	2.42E+02
	OAS-02D	10	9/15/00	9/25/00	2.71E+03	3.83E+02	2.59E+02
	OAS-03	19	9/15/00	9/25/00	1.09E+03	7.15E+02	4.21E+02
	OAS-04	28	9/18/00	9/26/00	8.53E+02	2.12E+02	1.52E+02
	OAS-05	35	9/21/00	9/28/00	1.63E+03	DET	DET
	OAS-06	41	9/21/00	9/28/00	2.51E+03	DET	DET
	OAS-07	48	9/25/00	9/29/00	2.44E+03	5.98E+01	1.05E+02
	OAS-07D	49	9/25/00	10/2/00	2.10E+03	8.08E+01	1.58E+02
	OAS-08	59	9/25/00	10/3/00	2.34E+02	<MDL	<MDL
	OAS-09	65	9/28/00	10/3/00	4.81E+02	<MDL	DET
	OAS-10	72	9/28/00	10/3/00	5.77E+02	<MDL	DET
	OAS-10D	73	9/28/00	10/5/00	6.04E+02	<MDL	<MDL
	OAS-11	83	10/2/00	10/6/00	9.66E+02	<MDL	<MDL
	OAS-12	90	10/2/00	10/6/00	6.26E+02	<MDL	<MDL
	OAS-13	96	10/5/00	10/6/00	1.11E+03	<MDL	<MDL
	OAS-14	103	10/5/00	10/12/00	1.62E+03	<MDL	<MDL
	OAS-15	113	10/10/00	10/12/00	1.31E+03	<MDL	<MDL
	OAS-15D	114	10/10/00	10/12/00	1.32E+03	<MDL	<MDL
	OAS-16	120	10/10/00	10/16/00	2.14E+03	<MDL	<MDL
	OAS-17	127	10/16/00	10/16/00	4.78E+02	<MDL	<MDL
	OAS-18	135	10/16/00	10/16/00	1.28E+03	<MDL	DET
	OAS-19	144	10/16/00	10/17/00	1.10E+03	<MDL	<MDL
	OAS-19D	145	10/16/00	10/17/00	1.14E+03	<MDL	<MDL
	OAS-20	153	10/19/00	10/23/00	3.50E+03	<MDL	<MDL
	OAS-20D	154	10/19/00	10/23/00	3.66E+03	<MDL	<MDL
	OAS-21	163	10/19/00	10/23/00	2.23E+03	<MDL	<MDL
	OAS-22	171	10/20/00	10/25/00	2.72E+03	DET	DET
	OAS-23	178	10/20/00	10/27/00	7.13E+03	<MDL	4.87E+00
	OAS-24	185	10/26/00	10/30/00	2.41E+03	<MDL	DET
	OAS-25	191	10/26/00	10/30/00	2.30E+03	<MDL	<MDL
	OAS-26	198	10/27/00	10/31/00	8.71E+02	<MDL	<MDL
	OAS-26D	199	10/27/00	10/31/00	8.86E+02	<MDL	<MDL
	OAS-27	209	10/27/00	11/1/00	4.69E+02	1.36E+02	2.94E+02
	OAS-28	215	11/1/00	11/1/00	2.61E+02	<MDL	<MDL
	OAS-29	221	11/3/00	11/7/00	4.01E+02	<MDL	<MDL
	OAS-30	228	11/3/00	11/6/00	2.63E+02	<MDL	<MDL
	OAS-30D	229	11/3/00	11/6/00	2.41E+02	<MDL	<MDL
	OAS-31	240	11/3/00	11/7/00	2.98E+02	1.13E+03	3.33E+02

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
PMS	PMS-01	6	9/13/00	9/14/00	1.97E+04	2.14E+02	9.67E+01
	PMS-02	13	9/15/00	9/25/00	3.92E+04	1.45E+02	1.14E+02
	PMS-03	24	9/15/00	9/27/00	4.29E+03	<MDL	<MDL
	PMS-03D	25	9/15/00	9/27/00	4.33E+03	<MDL	DET
	PMS-04	31	9/18/00	9/27/00	1.70E+04	2.69E+02	2.53E+02
	PMS-05	38	9/21/00	9/28/00	4.36E+04	1.72E+03	1.88E+03
	PMS-06	44	9/21/00	9/28/00	6.00E+04	3.43E+02	3.33E+02
	PMS-07	54	9/25/00	9/30/00	7.73E+03	<MDL	<MDL
	PMS-07D	55	9/25/00	10/3/00	5.06E+03	<MDL	<MDL
	PMS-08	62	9/25/00	10/3/00	1.51E+04	<MDL	<MDL
	PMS-09	68	9/28/00	10/5/00	4.83E+03	<MDL	<MDL
	PMS-10	78	9/28/00	10/5/00	1.06E+04	<MDL	<MDL
	PMS-10D	79	9/28/00	10/5/00	1.38E+04	<MDL	<MDL
	PMS-11	86	10/2/00	10/6/00	5.16E+04	<MDL	<MDL
	PMS-12	93	10/2/00	10/11/00	8.33E+04	DET	DET
	PMS-13	99	10/5/00	10/12/00	3.02E+03	<MDL	<MDL
	PMS-14	108	10/5/00	10/12/00	4.43E+03	<MDL	<MDL
	PMS-14D	109	10/5/00	10/12/00	3.55E+03	<MDL	<MDL
	PMS-15	117	10/10/00	10/13/00	4.91E+03	<MDL	<MDL
	PMS-16	123	10/10/00	10/16/00	7.36E+03	<MDL	<MDL
	PMS-17	130	10/16/00	10/17/00	2.11E+04	<MDL	<MDL
	PMS-18	140	10/16/00	10/18/00	5.09E+04	<MDL	<MDL
	PMS-18D	141	10/16/00	10/18/00	4.87E+04	<MDL	DET
	PMS-19	149	10/16/00	10/19/00	1.09E+05	4.52E+01	DET
	PMS-20	158	10/19/00	10/23/00	8.64E+04	5.31E+01	DET
	PMS-20D	159	10/19/00	10/24/00	8.93E+04	<MDL	<MDL
	PMS-21	167	10/19/00	10/26/00	1.53E+04	<MDL	<MDL
	PMS-22	174	10/20/00	10/25/00	2.66E+04	<MDL	<MDL
	PMS-23	181	10/20/00	10/30/00	1.61E+04	5.04E+01	4.34E+01
	PMS-24	188	10/26/00	10/30/00	1.19E+05	1.59E+03	1.43E+03
	PMS-25	194	10/26/00	10/31/00	3.28E+04	2.19E+02	2.17E+02
	PMS-26	204	10/27/00	11/1/00	1.19E+04	DET	DET
	PMS-26D	205	10/27/00	11/1/00	1.12E+04	DET	DET
	PMS-27	212	10/27/00	11/2/00	9.90E+03	<MDL	<MDL
	PMS-28	218	11/1/00	11/2/00	2.10E+03	<MDL	<MDL
	PMS-29	224	11/3/00	11/7/00	6.90E+03	<MDL	<MDL
	PMS-30	234	11/3/00	11/9/00	6.62E+03	DET	DET
	PMS-30D	235	11/3/00	11/9/00	6.76E+03	DET	DET
	PMS-31	243	11/3/00	11/6/00	1.48E+03	<MDL	<MDL

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
SAL	SAL-01	2	9/13/00	9/14/00	7.67E+03	9.10E+01	DET
	SAL-02	8	9/15/00	9/25/00	8.28E+03	<MDL ¹	<MDL ¹
	SAL-03	17	9/15/00	9/26/00	5.82E+03	<MDL ²	<MDL ²
	SAL-03D	18	9/15/00	9/26/00	5.67E+03	<MDL ²	<MDL ²
	SAL-04	27	9/18/00	9/27/00	3.75E+03	<MDL	<MDL
	SAL-05	34	9/21/00	9/28/00	5.61E+03	DET	DET
	SAL06	40	9/21/00	10/3/00	1.36E+04	<MDL	<MDL
	SAL-07	46	9/25/00	9/29/00	6.88E+03	<MDL	<MDL
	SAL-07D	47	9/25/00	10/2/00	5.78E+03	<MDL	<MDL
	SAL-08	58	9/25/00	10/3/00	1.06E+04	<MDL	<MDL
	SAL-09	64	9/28/00	10/3/00	5.72E+02	<MDL	<MDL
	SAL-10D	71	9/28/00	10/3/00	1.01E+03	<MDL	<MDL
	SAL-11	82	10/2/00	10/5/00	2.94E+02	<MDL	<MDL
	SAL-12	89	10/2/00	10/6/00	1.00E+04	<MDL	<MDL
	SAL-13	95	10/5/00	10/6/00	7.30E+02	<MDL	<MDL
	SAL-14	101	10/5/00	10/11/00	3.52E+02	<MDL	<MDL
	SAL-14D	102	10/5/00	10/11/00	3.47E+02	<MDL	<MDL
	SAL-15	112	10/10/00	10/13/00	4.17E+03	<MDL	<MDL
	SAL-16	119	10/10/00	10/16/00	2.51E+03	<MDL	<MDL
	SAL-17	126	10/16/00	10/16/00	2.38E+02	<MDL	<MDL
	SAL-18	133	10/16/00	10/16/00	1.49E+03	<MDL	<MDL
	SAL-18D	134	10/16/00	10/16/00	1.52E+03	<MDL	<MDL
	SAL-19	143	10/16/00	10/18/00	6.39E+03	<MDL	<MDL
	SAL-20	152	10/19/00	10/23/00	3.07E+04	2.22E+02	1.29E+02
	SAL-21	162	10/19/00	10/23/00	4.69E+03	1.50E+02	1.02E+02
	SAL-22	169	10/20/00	10/25/00	3.01E+03	<MDL	<MDL
	SAL-22D	170	10/20/00	10/25/00	3.15E+03	<MDL	<MDL
	SAL-23	177	10/20/00	10/27/00	8.23E+03	DET	6.03E+01
	SAL-24	184	10/26/00	10/30/00	9.23E+03	<MDL	<MDL
	SAL-25	190	10/26/00	10/30/00	4.77E+03	<MDL	<MDL
	SAL-26D	196	10/27/00	10/31/00	2.52E+03	5.81E+01	DET
	SAL-26	197	10/27/00	10/31/00	2.47E+03	4.52E+01	<MDL
	SAL-27	208	10/27/00	11/2/00	2.12E+03	<MDL	DET
	SAL-28	214	11/1/00	11/1/00	3.91E+02	<MDL	<MDL
	SAL-29	220	11/3/00	11/7/00	5.01E+02	<MDL	<MDL
	SAL-30	226	11/3/00	11/6/00	5.52E+02	<MDL	<MDL
	SAL-30D	227	11/3/00	11/6/00	5.43E+02	<MDL	<MDL
	SAL-31	238	11/3/00	11/7/00	7.49E+02	DET	<MDL

Table 2. Monterey County Ambient Monitoring Results

Site	Sample ID	Log Number	Date Received	Date Analyzed	Results (ng/m ³)		
					Bromomethane	cis-1,3-dichloropropene	trans-1,3-dichloropropene
SES	SES-01	7	9/13/00	9/14/00	3.67E+04	<MDL ²	<MDL ²
	SES-02	14	9/15/00	9/25/00	6.37E+04	<MDL ³	<MDL ³
	SES-03	26	9/15/00	9/27/00	1.02E+04	1.79E+02	2.25E+02
	SES-04	32	9/18/00	9/27/00	1.76E+04	8.91E+01	9.94E+01
	SES-04D	33	9/18/00	9/27/00	1.89E+04	9.80E+01	9.07E+01
	SES-05	39	9/21/00	9/28/00	1.52E+04	<MDL	DET
	SES-06	45	9/21/00	9/29/00	2.80E+04	1.25E+02	1.47E+02
	SES-07	56	9/25/00	9/29/00	6.16E+02	<MDL	<MDL
	SES-07D	57	9/25/00	9/28/00	5.39E+02	<MDL	<MDL
	SES-08	63	9/25/00	10/3/00	8.14E+02	<MDL	<MDL
	SES-09	69	9/28/00	10/5/00	4.72E+03	<MDL	<MDL
	SES-10	80	9/28/00	10/5/00	3.20E+03	<MDL	<MDL
	SES-10D	81	9/28/00	10/5/00	3.11E+03	<MDL	<MDL
	SES-11	87	10/2/00	10/6/00	6.56E+03	<MDL	DET
	SES-12	94	10/2/00	10/11/00	1.60E+04	<MDL	<MDL
	SES-13	100	10/5/00	10/12/00	3.35E+03	<MDL	<MDL
	SES-14	110	10/5/00	10/13/00	1.84E+03	<MDL	<MDL
	SES-14D	111	10/5/00	10/13/00	1.85E+03	<MDL	<MDL
	SES-15	118	10/10/00	10/16/00	1.69E+03	<MDL	<MDL
	SES-16	124	10/10/00	10/16/00	8.88E+03	<MDL	<MDL
	SES-17	131	10/16/00	10/18/00	3.73E+03	<MDL	<MDL
	SES-17D	132	10/16/00	10/17/00	4.14E+03	<MDL	<MDL
	SES-18	142	10/16/00	10/18/00	2.00E+03	<MDL	<MDL
	SES-19	150	10/16/00	10/19/00	3.59E+03	<MDL	<MDL
	SES-20	160	10/19/00	10/23/00	1.26E+04	<MDL	<MDL
	SES-20D	161	10/19/00	10/23/00	1.27E+04	<MDL	<MDL
	SES-21	168	10/19/00	10/25/00	1.15E+04	<MDL	<MDL
	SES-22	175	10/20/00	10/25/00	1.85E+04	DET	DET
	SES-23	182	10/20/00	10/30/00	1.37E+04	9.06E+01	<MDL
	SES-24	189	10/26/00	10/30/00	1.27E+04	<MDL	DET
	SES-25	195	10/26/00	10/31/00	4.67E+03	<MDL	DET
	SES-26	206	10/27/00	11/1/00	8.18E+03	<MDL	<MDL
	SES-26D	207	10/27/00	11/2/00	8.65E+03	<MDL	<MDL
	SES-27	213	10/27/00	11/2/00	5.13E+03	<MDL	DET
	SES-28	219	11/1/00	11/2/00	3.15E+02	<MDL	<MDL
	SES-29	225	11/3/00	11/6/00	1.04E+03	<MDL	<MDL
	SES-30	236	11/3/00	11/6/00	6.20E+02	<MDL	<MDL
	SES-30D	237	11/3/00	11/6/00	6.32E+02	<MDL	<MDL
	SES-31	244	11/3/00	11/9/00	1.41E+03	<MDL	<MDL

Table 2 Notes: Monterey County Ambient Monitoring

If analysis result is \geq MDL and $<$ EQL it is reported in the table as detected (DET). Levels \geq EQL are reported as the actual measured value and are reported to three significant figures.

$<$ MDL = Less than method detection limit

Footnotes:

1. Due to sample dilution SAL-02 and LJE-03 MDL's for Telone should be adjusted to 30.21 ng/m^3 and 43.46 ng/m^3 the cis and trans isomers respectively.
2. Due to sample dilution SAL-03, SAL-03D and SES-01 MDL's for Telone should be adjusted to 22.80 ng/m^3 and 32.80 ng/m^3 for the cis and trans isomers respectively.
3. Due to sample dilution SES-02 MDL's for Telone should be adjusted to 45.60 ng/m^3 and 65.60 ng/m^3 the cis and trans isomers respectively.

LJE-08 (Log # 61): collection canister leaked, sample was not analyzed

SAL-10 (Log # 70): Field Spike #2 (9/26/00) was sampled in place of a primary sample

Site location identification:

SAL: APCD monitoring site in Salinas
OAS: Oak Avenue School
CHU: Chualar School
LJE: La Joya Elementary School
PMS: Pajaro Middle School
SES: Salsipuedes Elementary School

NA Not Applicable: Data not collected for this sample due to laboratory error.

TABLE 3: Ambient Canister Field Spike Results**Low Range Samples**

Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)
DPR 1113	111	97	87	123	108	89	123	110	89
DPR 1102	111	136	122	123	101	82	123	104	85
DPR 1053	111	143	129	123	97	79	123	104	85
DPR 1109	111	148	133	123	90	73	123	91	74

High Range Samples

Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)
DPR 1052	418	434	104	460	487	106	460	448	97
DPR 1062	418	490	117	460	424	92	460	405	88
DPR 1092	418	456	109	460	398	87	460	409	90
DPR 1065	418	458	110	460	487	106	460	451	98

Note:

Sampled at 13th and T Sacramento on 7/12/00

TABLE 4: Canister Stability

Time (days)	Canister Number	Bromomethane		Cis-1,3-dichloropropene		Trans-1,3-dichloropropene	
		Area analyte/Area Internal Std	Recovery (%)	Area analyte/Area Internal Std	Recovery (%)	Area analyte/Area Internal Std	Recovery (%)
0	DPR1059	2.33	NA	1.66	NA	1.25	NA
	DPR1062	2.23	NA	1.54	NA	1.14	NA
	DPR1104	2.35	NA	1.76	NA	1.32	NA
	DPR1149	2.08	NA	1.39	NA	0.96	NA
5	DPR1059	2.39	103	1.70	102	1.32	106
	DPR1062	2.37	106	1.76	114	1.35	118
	DPR1104	2.43	103	1.62	92	1.26	95
	DPR1149	2.21	106	1.43	103	1.02	106
13	DPR1059	2.61	112	1.74	105	1.40	112
	DPR1062	2.64	118	1.7	110	1.31	115
	DPR1104	2.69	114	1.85	105	1.48	112
	DPR1149	2.34	112	1.40	101	1.04	108
35	DPR1059	2.31	99	1.72	104	1.43	114
	DPR1062	2.26	101	1.63	106	1.26	111
	DPR1104	2.34	100	1.86	106	1.56	118
	DPR1149	2.10	101	1.39	100	1.08	113

TABLE 5: Laboratory Control Sample Results

Laboratory ID	Date Analyzed	Results (ng/m ³)		
		Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
LCS0913	9/13/00	557.61	276.00	359.30
LCS0914	9/14/00	550.25	291.51	402.62
LCS0915	9/15/00	568.00	288.40	392.90
LCS0925	9/25/00	470.55	255.39	399.83
LCS0925A	9/25/00	469.78	258.25	409.90
LCS0925B	9/25/00	463.39	260.34	399.79
LCS0925C	9/25/00	486.51	266.45	403.17
LCS0925D	9/25/00	478.32	256.50	382.56
LCS0926	9/26/00	482.29	283.34	436.11
LCS0927	9/27/00	487.53	295.09	446.87
LCS0928	9/28/00	480.33	289.77	439.32
LCS0929	9/29/00	503.16	300.34	451.34
LCS1002	10/2/00	473.67	277.39	391.42
LCS1003	10/3/00	475.74	295.71	429.56
LCS1004	10/4/00	499.56	314.63	460.75
LCS1005	10/5/00	510.32	283.75	405.49
LCS1006A	10/6/00	517.73	265.12	342.64
LCS1011	10/11/00	549.12	317.60	488.05
LCS1012	10/12/00	541.30	353.86	535.08
LCS1013	10/13/00	578.25	363.37	560.46
LCS1016	10/16/00	575.33	372.72	589.43
LCS1017	10/17/00	565.05	356.61	546.29
LCS1018	10/18/00	510.58	303.13	423.34
LCS1019	10/19/00	526.08	251.70	359.30
LCS1020	10/20/00	558.24	243.30	324.52
LCS1023	10/23/00	526.03	330.95	486.92
LCS1024	10/24/00	519.48	310.34	462.34
LCS1025	10/25/00	511.53	261.48	420.84
LCS1025A	10/25/00	542.00	317.27	461.69
LCS1026A	10/26/00	510.99	310.89	446.65
LCS1027	10/27/00	521.43	328.90	483.12
LCS1030	10/30/00	545.93	330.42	491.83
LCS1021	10/31/00	529.33	337.41	495.01
LCS1101	11/1/00	522.07	314.72	458.10
LCS1102	11/2/00	530.98	321.81	475.28
LCS1106	11/6/00	587.23	323.42	496.68
LCS1107	11/7/00	602.07	347.69	514.70
LCS1109	11/9/00	497.70	286.83	398.46
LCS1113	11/13/00	517.97	292.16	417.37
LCS1113A	11/13/00	520.88	300.89	410.25

TABLE 6: Canister Spikes**Trip Spike Results**

Sample Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)
9/11/00	DPR 1139	272	286	105	300	316	105	300	299	100
9/26/00	DPR 1073	268	286	107	295	295	100	295	313	106
10/20/00	DPR 1133	270	237	88	298	167	56	298	163	56
11/2/00	DPR 1196	277	293	106	306	283	92	306	271	89

Field Spike Results

Sample Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)
9/11/00	DPR 1069	548	7991	1458	604	840	139	604	830	137
9/26/00	DPR 1165	512	1565	357	567	658	116	567	703	124
10/20/00	DPR 1083	483	7476	1150	533	388	73	533	405	76
11/2/00	DPR 1108	537	1198	223	593	665	112	593	651	110

Lab Spike Results

Sample Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)	Expected (ng/m ³)	Actual (ng/m ³)	Recovery (%)
9/11/00	DPR 1067	279	294	105	307	288	94	307	273	89
9/26/00	DPR 1056	283	300	106	312	314	101	312	297	95
10/20/00	DPR 1142	272	265	97	300	262	87	300	280	93
11/2/00	DPR 1081	273	263	96	301	242	80	301	253	84

TABLE 7: Trip Blank Results

Canister Number	Date	Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
DPR 1094	9/11/00	<MDL	<MDL	<MDL
DPR 1165	9/26/00	<MDL	<MDL	<MDL
DPR 1083	10/20/00	<MDL	<MDL	<MDL
DPR 1108	11/02/00	<MDL	<MDL	<MDL

TABLE 8: Laboratory Duplicate Precision for Bromomethane and 1,3-Dichloropropene (Telone)

Site	Log Number	Sample ID	Date Received	Date Analyzed	Results (ng/m ³)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
CHU	74	CHU-10	9/28/00	10/5/00	1.25E+03	<MDL	<MDL	0.62	NA	NA
					1.24E+03	<MDL	<MDL			
	104	CHU-14	10/5/00	10/11/00	1.20E+03	<MDL	<MDL	0.47	NA	NA
					1.20E+03	<MDL	<MDL			
	164	CHU-21	10/19/00	10/24/00	4.20E+03	2.88E+02	2.02E+02	-1.32	-3.57	-4.06
					4.26E+03	2.99E+02	2.10E+02			
	201	CHU-26D	10/27/00	10/31/00	1.15E+03	8.52E+01	<MDL	1.85	-9.80	NA
					1.13E+03	9.40E+01	<MDL			
	222	CHU-29	11/3/00	11/6/00	4.37E+02	<MDL	<MDL	-3.08	NA	NA
					4.51E+02	<MDL	<MDL			
LJE	53	LJE-07D	9/25/00	10/2/00	4.99E+03	<MDL	<MDL	0.79	NA	NA
					4.95E+03	<MDL	<MDL			
	129	LJE-17	10/16/00	10/16/00	3.24E+02	<MDL	DET	-2.16	NA	NA
					3.31E+02	<MDL	<MDL			
	147	LJE-19	10/16/00	10/18/00	3.94E+03	<MDL	<MDL	-0.64	NA	NA
					3.96E+03	<MDL	<MDL			
	180	LJE-23	10/20/00	10/30/00	1.43E+04	<MDL	<MDL	29.67	NA	NA
					1.06E+04	<MDL	<MDL			
	211	LJE-27	10/27/00	11/2/00	4.87E+03	<MDL	<MDL	-0.42	NA	NA
					4.89E+03	<MDL	<MDL			

TABLE 8: Continued

Site	Log Number	Sample ID	Date Received	Date Analyzed	Results (ng/m ³)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
OAS	19	OAS-03	9/15/00	9/25/00	1.09E+03	7.15E+02	4.21E+02	-29.38	-2.34	-3.77
					1.46E+03	7.32E+02	4.37E+02			
	83	OAS-11	10/2/00	10/6/00	9.66E+02	<MDL	<MDL	1.85	NA	NA
					9.49E+02	<MDL	<MDL			
	96	OAS-13	10/5/00	10/6/00	1.11E+03	<MDL	<MDL	0.79	NA	NA
					1.10E+03	<MDL	<MDL			
	198	OAS-26	10/27/00	10/31/00	8.71E+02	<MDL	<MDL	-0.79	NA	NA
					8.78E+02	<MDL	<MDL			
	229	OAS-30D	11/3/00	11/6/00	2.41E+02	<MDL	<MDL	-1.84	NA	NA
					2.46E+02	<MDL	<MDL			
	240	OAS-31	11/3/00	11/7/00	2.98E+02	1.13E+03	3.33E+02	-1.05	-3.01	-2.16
					3.01E+02	1.17E+03	3.40E+02			
PMS	38	PMS-05	9/21/00	9/28/00	1.88E+04	1.72E+03	1.88E+03	1.08	4.82	3.54
					1.86E+04	1.64E+03	1.81E+03			
	99	PMS-13	10/5/00	10/11/00	3.02E+03	<MDL	<MDL	3.48	NA	NA
					2.91E+03	<MDL	<MDL			
	188	PMS-24	10/26/00	10/30/00	1.19E+05	1.59E+03	1.43E+03	0.33	-11.87	-9.06
					1.19E+05	1.79E+03	1.57E+03			

TABLE 8: Continued

Site	Log Number	Sample ID	Date Received	Date Analyzed	Results (ng/m ³)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
SAL	2	SAL-01	9/13/00	9/14/00	7.67E+03	9.10E+01	DET	0.07	4.16	NA
					7.67E+03	8.73E+01	DET			
	8	SAL-02	9/15/00	9/25/00	8.28E+03	<MDL	<MDL	-12.30	NA	NA
					9.37E+03	<MDL	<MDL			
	46	SAL-07	9/25/00	9/29/00	6.88E+03	<MDL	<MDL	3.23	NA	NA
					6.66E+03	<MDL	<MDL			
	112	SAL-15	10/10/00	10/12/00	4.17E+03	<MDL	<MDL	1.82	NA	NA
					4.10E+03	<MDL	<MDL			
	126	SAL-17	10/16/00	10/16/00	2.38E+02	<MDL	<MDL	5.65	NA	NA
					2.25E+02	<MDL	<MDL			
	152	SAL-20	10/19/00	10/23/00	3.07E+04	2.22E+02	1.29E+02	1.72	22.77	27.20
					3.02E+04	1.77E+02	9.79E+01			
	170	SAL-22D	10/20/00	10/24/00	3.03E+03	<MDL	<MDL	0.82	NA	NA
					3.00E+03	<MDL	<MDL			
	177	SAL-23	10/20/00	10/26/00	6.07E+03	DET	6.03E+01	0.22	NA	-3.54
					6.05E+03	DET	6.24E+01			
	220	SAL-29	11/3/00	11/7/00	5.01E+02	<MDL	<MDL	-0.37	NA	NA
					5.03E+02	<MDL	<MDL			
SES	32	SES-04D	9/18/00	9/27/00	1.76E+04	8.91E+01	9.94E+01	2.43	-0.79	6.06
					1.72E+04	8.98E+01	9.35E+01			
	45	SAL-02	9/21/00	9/28/00	1.40E+04	1.25E+02	1.47E+02	1.55	-8.13	-10.21
					1.37E+04	1.35E+02	1.63E+02			
	69	SES-09	9/28/00	10/3/00	3.74E+03	<MDL	<MDL	1.80	NA	NA
					3.67E+03	<MDL	<MDL			

TABLE 8: Continued

Site	Log Number	Sample ID	Date Received	Date Analyzed	Results (ng/m ³)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
SES	110	SES-14	10/5/00	10/12/00	1.81E+03	<MDL	<MDL	-0.03	NA	NA
					1.81E+03	<MDL	<MDL			
	118	SES-15	10/10/00	10/13/00	1.66E+03	<MDL	<MDL	1.72	NA	NA
					1.63E+03	<MDL	<MDL			
	131	SES-17	10/16/00	10/17/00	3.79E+03	<MDL	<MDL	-2.56	NA	NA
					3.89E+03	<MDL	<MDL			
	207	SES-26D	10/27/00	11/2/00	8.65E+03	<MDL	<MDL	-0.71	NA	NA
					8.71E+03	<MDL	<MDL			
Field Spike	239	Field Spike	11/3/00	11/13/00	1.20E+03	6.66E+02	6.51E+02	2.92	7.90	10.04
					1.17E+03	6.16E+02	5.89E+02			

Notes:

DET Detected below the estimated quantitation limit
 ID Identification number
 <MDL Less than the minimum detection limit
 m³ Cubic meters
 ml Milliliters
 NA Not applicable
 Ng Nanograms

Appendices: 1 through 5

Appendix 1

Standard Operating Procedure Sampling and Analysis of Bromomethane in Silco™ Canisters

Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division
CALIFORNIA AIR RESOURCES BOARD

**Standard Operating Procedure for the Sampling and
Analysis of Bromomethane In Silco™ Canisters**

Version 1.0
July 26, 2000

APPROVED BY:
Michael P. Spears, Manager
Special Analysis Section

- 1.0 **SCOPE:** This method is for the sampling and analysis of bromomethane (Methyl Bromide) in ambient air using 6 liter Silco™ canisters for sample collection. Collected samples are analyzed by gas chromatography/mass spectrometry.
- 2.0 **SUMMARY OF METHOD:** Ambient air is collected into evacuated 6-liter Silco™ canisters. Field sampling uses a sub-atmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using deuterated bromomethane (bromomethane-d3) as an internal standard.
- 3.0 **INTERFERENCES/LIMITATIONS:** Interference may result from improperly cleaned canisters. Analysis of samples containing high concentrations of bromomethane may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.
- 4.0 **EQUIPMENT AND CONDITIONS**

A. Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:

Detector: 280° C

Injector: 220° C

Column: J&W DB-624, 60 meter, 0.25mm I.D., 1.40 micron film thickness

GC temperature program: initial 40° C, initial time 5.0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min

Carrier Gas: Helium, grade 5

Hewlett Packard 5973 mass selective detector:

Acquisition Mode: SIM

Tune File: PFTBA Autotune

Ions Monitored: 93.8, 95.8, 96.8, 98.8

Quant Ions: 93.8 parent, 96.8 isotope

Solvent Delay: 5.00 min

Nutech 3550A cryogenic concentrator:

Valve Oven: 60°

Autosampler Oven: 50°

Nafion Dryer: ambient

Sample Line: 100°

Cryotrap: -160° C to 150°

Transfer Line: 150° C

Cryofocus: -175° C to 150° C

Sample Size: 400 ml

Internal Standard Loop: 2 ml

B. Auxiliary Apparatus

Compressed helium: grade 5
Compressed air: ultra zero grade
Compressed nitrogen: grade 5
Liquid nitrogen for cryogenic concentrator
Certified bromomethane standard
Restek, 6.0 liter Silcosteel canisters with silcosteel valve
Pressure gauge, -30 inches Hg to 30 psig
Canister cleaning system (Appendix 3)

5.0 ANALYSIS OF SAMPLES

- 1) Perform a PFTBA autotune and evaluate tune criteria (Appendix 4). Place a copy of the autotune results in the autotune folder.
- 2) Check and record the pressure in the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
- 3) Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a system blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
- 4) Prepare a sample sequence for the Nuteck. Organize the sample sequence as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within $\pm 20\%$ of its expected value the system must be recalibrated.
- 5) Attach the sample canisters to the Nuteck autosampler ring as per the sequence. Execute the Nuteck sequence.
- 6) Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization prior to analysis. Instrument reports will be in units of ng/m^3 and must be corrected for the analysis dilution using the following calculation:

$$(F_p / I_p) \times C_i = C_r$$

I_p = initial canister pressure in mm Hg

F_p = final canister pressure in mm Hg

C_i = concentration from the analysis report in ng/m^3

C_r = reported concentration in ng/m^3

6.0 QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five replicate samples of bromomethane standard at three concentrations (low, mid and high range).

B. Linearity

A 6-point calibration is performed. Calibrators from 0.027 to 0.861 $\mu\text{g}/\text{m}^3$ are used to construct a calibration curve by linear regression analysis.

$$\text{Response Ratio} = 9.56 \text{ e } +001 \times \text{Amount} + 2.63 \text{ e } -001$$

$$r^2 = 0.999$$

C. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spikes, the method detection limit (MDL), and the estimated quantitation limit (EQL) for bromomethane is calculated by:

$$\text{MDL} = 3.14 \times s$$

$$\text{EQL} = 5 \times \text{MDL}$$

where: s = the standard deviation of the response calculated for the seven replicate spikes. Given $s = 0.0015 \mu\text{g}/\text{m}^3$ for the seven samples, the MDL and EQL are calculated as follows.

$$\text{MDL} = 3.14 (0.0015 \mu\text{g}/\text{m}^3) = 0.0047 \mu\text{g}/\text{m}^3$$

$$\text{EQL} = 5(0.0047 \mu\text{g}/\text{m}^3) = 0.024 \mu\text{g}/\text{m}^3$$

Assuming a 1:1.5 dilution to pressurize ambient samples:

$$\text{EQL} = 1.5 (0.024 \mu\text{g}/\text{m}^3) = 0.036 \mu\text{g}/\text{m}^3$$

Results greater than or equal to the EQL are reported to three significant figures. Results below EQL and greater than or equal to the MDL are reported as DET (detected). Results less than MDL are reported as <MDL.

D. Storage Stability

Conduct a storage stability study of bromomethane over a 3-week period. Four (4) canisters are spiked with bromomethane at approximately 0.5 ppb. The spiked canisters are stored at ambient temperature and analyzed on storage weeks 0, 1, 2, 3. Restek Corporation conducted a stability study for methyl bromide in Silco™ canisters and demonstrated that it is stable at 1 ppbv for at least 16 days. A Special Analysis Section stability study reported that the analytes of interest are stable for at least 31 days.

- E. Safety Precautions: This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance, refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

Appendix 2

Standard Operating Procedure Sampling and Analysis of 1,3-Dichloropropene in Silco™ Canisters

Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division
CALIFORNIA AIR RESOURCES BOARD

**Standard Operating Procedure for Sampling and
Analysis of 1,3-Dichloropropene In Silco™ Canisters**

Version 1.0
July 26, 2000

APPROVED BY:
Michael P. Spears, Manager
Special Analysis Section

- 1.0 **SCOPE:** This method is for the sampling and analysis of 1,3-Dichloropropene in ambient air using 6-liter Silco™ canisters for sample collection. 1,3-Dichloropropene is a mixture of cis-1,3-Dichloropropene and trans-1,3-Dichloropropene. This method analyzes and reports each isomer as a separate compound. Collected samples are analyzed by gas chromatography/mass spectrometry.
- 2.0 **SUMMARY OF METHOD:** Ambient air is collected into evacuated 6-liter Silco™ canisters. Field sampling uses a subatmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using 1,2-dichloropropane-d6 as an internal standard.
- 3.0 **INTERFERENCES/LIMITATIONS:** Interferences may result from improperly cleaned canisters. Analysis of samples containing high concentrations of 1,3-Dichloropropene may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.
- 4.0 **EQUIPMENT AND CONDITIONS**

A. Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:

Detector: 280° C

Injector: 220° C

Column: J&W DB-624, 60 meter, 0.25mm I.D., 1.40 micron film thickness

GC temperature program: initial 40° C, initial time 5.0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min

Carrier Gas: Helium, grade 5

Hewlett Packard 5973 mass selective detector:

Acquisition Mode: SIM

Tune File: PFTBA Autotune

Ions Monitored: 66.8, 68.8, 74.8, 76.8, 110.0

Quantitation Ions: 74.8 parent, 66.8 isotope

Solvent Delay: 5.00 min

Nutech 3550A cryogenic concentrator:

Valve Oven: 60°

Autosampler Oven: 50°

Nafion Dryer: ambient

Sample Line: 100°

Cryotrap: -160° C to 150°

Transfer Line: 150° C
Cryofocus: -175° C to 150° C
Sample Size: 400 ml
Internal Standard Loop: 2 ml

B. Auxiliary Apparatus

Compressed helium: grade 5
Compressed air: ultra zero grade
Compressed nitrogen: grade 5
Liquid nitrogen for cryogenic concentrator
Certified bromomethane standard
Restek, 6.0-liter Silcosteel canisters with silcosteel valve
Pressure gauge, -30 inches Hg to 30 psig
Canister cleaning system (Appendix 3)

5.0 ANALYSIS OF SAMPLES

- 1) Perform a PFTBA autotune and evaluate tune criteria (Appendix 4). Place a copy of the autotune results in the autotune folder.
- 2) Check and record the pressure in the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
- 3) Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a zero air blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
- 4) Prepare a sample sequence for the Nuteck. The sample sequence should be organized as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within $\pm 20\%$ of its assigned value the system must be recalibrated.
- 5) Attach the sample canisters to the Nuteck autosampler ring as per the sequence. Execute the Nuteck sequence.
- 6) Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization prior to analysis. Instrument reports will be in units of ng/m^3 and must be corrected for the analysis dilution using the following calculation:

$$(Fp / Ip) \times Ci = Cr$$

Ip = initial canister pressure in mm Hg
Fp = final canister pressure in mm Hg
Ci = concentration from the analysis report in ng/m^3
Cr = reported concentration in ng/m^3

6.0 QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five replicate samples of cis-1,3 dichloropropene and trans 1,3 dichloropropene standard at three concentrations (low, mid and high range).

B. Linearity:

A 6-point calibration was performed. Calibrators from 0.036 to 0.953 ug/m³ were used for both isomers and the results were used to calculate calibration curves using linear regression.

$$\begin{aligned}\text{Response Ratio (cis isomer)} &= 7.08\text{e}+001 \cdot \text{Amount} + 9.37\text{e}-002 \\ R^2 &= 0.999\end{aligned}$$

$$\begin{aligned}\text{Response Ratio (trans isomer)} &= 4.56\text{e}+001 \cdot \text{Amount} + 5.57\text{e}-002 \\ r^2 &= 0.999\end{aligned}$$

C. Minimum Detection Limit:

The detection limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spike, the method detection limits (MDL), and the estimated quantitation limits (EQL) for 1,3-dichloropropene isomers are calculated by:

MDL = 3.14*s and the EQL = 5*MDL, where: s = the standard deviation of the response calculated for the seven replicate spikes. Given s = 0.0018 ug/m³ (cis) and s = 0.0026 ug/m³ (trans) for the seven samples, the MDL and EQL are calculated as follows.

$$\begin{aligned}\text{MDL(cis)} &= 3.14 (0.0018 \text{ ug/m}^3) = 0.0057 \text{ ug/m}^3 \\ \text{EQL(cis)} &= 5(0.0057 \text{ ug/m}^3) = 0.028 \text{ ug/m}^3\end{aligned}$$

$$\begin{aligned}\text{MDL(trans)} &= 3.14 (0.0026 \text{ ug/m}^3) = 0.0082 \text{ ug/m}^3 \\ \text{EQL(trans)} &= 5(0.0082 \text{ ug/m}^3) = 0.041 \text{ ug/m}^3\end{aligned}$$

Assuming a 1:1.5 dilution to pressurize ambient samples:

$$\begin{aligned}\text{EQL(cis)} &= 1.5 (0.028 \text{ ug/m}^3) = 0.042 \text{ ug/m}^3 \\ \text{EQL(trans)} &= 1.5 (0.041 \text{ ug/m}^3) = 0.060 \text{ ug/m}^3\end{aligned}$$

Results equal to or greater than the EQL are reported to three significant figures. Results below EQL and above MDL are reported as DET (detected). Results less than MDL are reported <MDL.

D. Storage Stability:

Lab staff conducted a storage stability study of dichloropropene over a 3-week period. Four (4) canisters were spiked with dichloropropene at approximately 1 ppb. The spiked canisters were stored at ambient temperature and analyzed on storage weeks 0, 1, 2, and 3. A Special Analysis Section stability study reported that the analytes of interest are stable for at least 31 days.

E. Safety Precautions:

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance, refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

Appendix 3

Standard Operating Procedure For Cleaning Silco™ Canisters

Northern Laboratory Branch
Monitoring and Laboratory Division
CALIFORNIA AIR RESOURCES BOARD

SOP MLD SAS P1, Version 1.0
PESTICIDE SUPPORT PROGRAM

STANDARD OPERATING PROCEDURE FOR CLEANING SILCO™ CANISTERS

APPROVED BY:
Michael P. Spears, Manager
Special Analysis Section

November 15, 2000

DISCLAIMER: Mention of any trade name or commercial product in this Standard Operating Procedure does not constitute endorsement or recommendation of this product by the Air Resources Board (ARB). Specific brand names and instrument descriptions listed in the Standard Operating Procedure are for equipment used by the ARB laboratory.

1 INTRODUCTION

This document describes a method for cleaning six (6)-liter Silco™ canisters used for ambient air sampling of pesticides. The procedure is used to evacuate and pressurize individual canisters or groups of canisters in a heated oven.

2 SUMMARY OF METHOD

This method is based on EPA Method TO-14A. Up to eight (8) 6-liter canisters are connected to a manifold in an oven and evacuated to less than -30 inches of mercury. The canisters are heated to 70 degrees centigrade and purged four times with humidified ultrapure nitrogen. The purge cycling is from -30 inches mercury (Hg) to 25 pounds per square inch gauge (psig). Each cycle is 24 minutes (12 minutes vacuum and 12 minutes pressure). Both manual and automated procedures are provided. A liquid nitrogen cold trap on the vacuum line prohibits back-diffusion of the vacuum pump oil vapor and prevents water vapor from entering the vacuum pump.

3 INTERFERENCES AND LIMITATIONS

- 3.1 Canisters used for standards or controls may need reconditioning on a regular basis.
- 3.2 Canisters containing high pesticide concentrations may require more than one cleaning session to meet specified contamination criteria.

4 APPARATUS

- 4.1 Stainless steel tubing, 3/4 inch
- 4.2 Duo-Seal, two stage, vacuum pump, Edwards.
- 4.3 Stabil-Therm Electric Oven, Pro-Tronix-11.
- 4.4 Dewar, cylindrical, 1600 ml capacity, 80 mm ID, Kontes KM-611410-2116.
- 4.5 Valves, 1/2" Varian, Model # L8732-301
- 4.6 Safety glasses and cryogenic gloves
- 4.7 Valco Instruments Company Inc., Digital Valve Sequence Programmer
- 4.8 Humidifier Canister, a 6L SilcoCan™ canister filled with ≥500 ml of organic free distilled water (HPLC grade).

5 MATERIALS

- 5.1 Grade five ultra pure compressed nitrogen.
- 5.2 Liquid nitrogen.
- 5.3 HPLC grade water.

6 SAFETY

- 6.1 Do not pressurize the canisters to more than 30 psig.
- 6.2 Keep the liquid nitrogen dewar filled whenever the vacuum pump is running.
- 6.3 Do not allow trapped vacuum vapors to move into the clean part of the system.
- 6.4 Check vacuum pump oil level periodically. Change oil every six months.
- 6.5 The humidifying system (system bubbler) should always contain at least 500 ml of water for proper canister humidifying.
- 6.6 The nitrogen cylinder should be changed whenever the cylinder pressure drops below 500 psig.

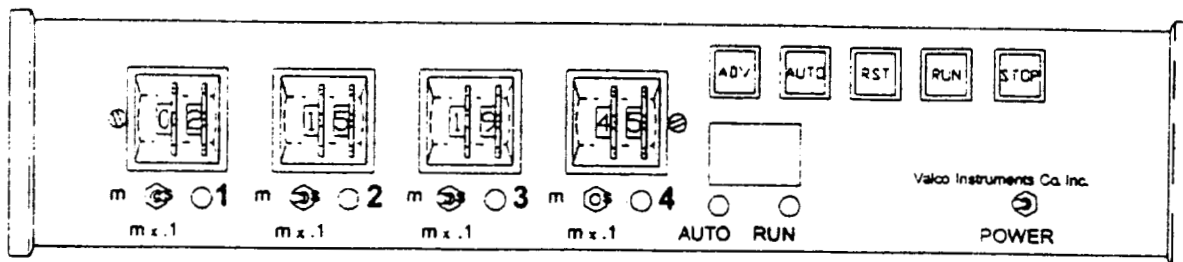
7.0 PROCEDURE

- 7.1. Vent all canisters in the hood.
- 7.2. Record canister number, sample number, date, and the canister designated as the batch quality control check (QA) in the Can Cleaning Logbook.
- 7.3. Fill dewar with liquid nitrogen.
- 7.4. Load canisters in the oven, attaching to the manifold and tighten so canisters do not rotate. Make certain the canister valves are open and the QC sample is easily reached.
- 7.5. Set oven heater to no more than 70 degrees centigrade, turn on heater and close the oven doors.
- 7.6. If cleaning less than eight (8) canisters the unused ports must be capped.

- 7.7. Turn on the vacuum pump, open the nitrogen tank and valves located on top of the humidifying canister. Set the nitrogen tank's second stage regulator between 20 and 25 psig.
- 7.8. Purging Cycle Timer usage
 - 7.8.1 The Valco instrument timers are located on the top of the canister-cleaning oven. Two black boxes make up the complete timing system.
 - 7.8.2 The upper box is used to set the cycle times and to set manual or automatic mode.
 - 7.8.3 Each purge cycle will last for 24 minutes, 12 minutes for evacuating and 12 minutes for pressurizing.
 - 7.8.4 The total cleaning process is a minimum of four purging cycles or a total of 96 minutes.
 - 7.8.5 Set digital switches above light one and light two to 12 minutes (See Figure 1). These represent the evacuating and pressurizing cycle times respectively. The digital switches associated with lights 3 and 4 are set to zero.
 - 7.8.6 The toggle switches located above mx.1 are set to "m" (minutes) for the lights 1 and 2 and set to "s" (seconds) for lights 3 and 4 (See Figure 1).
 - 7.8.7 The lower box is used to set the total cycle time. The number of purging cycles needed determines this. If using four purging cycles then the total time is set to 96 minutes.
 - 7.8.8 The digital switches on the lower box should be set as follows for a purging cycle of 96 minutes: 1, 96, 0, 1, or 1,48,48,0.
 - 7.8.9 Digital switches associated with lights 1 and 4 are used to turn on and turn off the automatic timing sequence while switches associated with lights 2 and 3 are set for total time. Each digital switch is set from 0 to 99 minutes. Therefore the maximum possible time is 198 minutes.
- 7.9 After the upper and lower boxes have been set, press the auto button on the upper timer (See Figure 1). The auto light should come on.
- 7.10 Press the run button on the lower timer (See Figure 1). The first light (1) should light briefly and then switch to light 2. The system will evacuate to – 30 inches Hg for 12 minutes.
- 7.11 Be sure to check the in-line pressure gauge to make certain the system is operating correctly.

- 7.12 At this point the system will switch between vacuum and pressure automatically ending the purging cycle with the canisters being under vacuum (-30 inches Hg).
- 7.13 The canister cleaning system can be manually operated.
 - 7.13.1 Proceed with loading the oven as stated above.
 - 7.13.2 Set the upper box to the desired cycle times.
 - 7.13.3 Using the advance button, activate either the vacuum cycle or pressure cycle.
 - 7.13.3.1 The lights for digital timers 1 and 2 will light indicating which cycle is being used. Also monitoring the pressure gauge will indicate what cycle is being used.
 - 7.13.3.2 Repeat this cycle three (3) times. On the last pressurization cycle, close the valve on the canister to be used as the QC check.
- 7.14 Perform a final canister evacuation, then close the remaining canister valves.
- 7.15 Turn off the vacuum pump, close the humidifier valves, and shut off the compressed nitrogen tank.
- 7.16 Turn off the canister oven heater, allow the canisters to cool to room temperature and then remove the canisters.
- 7.17 Give the QC check canister to the instrument operator for analysis.
- 7.18 Place the remaining unchecked canisters on the shelf located immediately next to the canister-cleaning oven.
- 7.19 After the canisters have been determined to be clean the field sampling sheets are photocopied. One copy is given to the project manager while one copy is placed in the field sampling sheet binder.

FIGURE 1



Revision History

Version	Date	Changes
1.0	November 15, 2000	Initial Version

Appendix 4

Mass Selective Detector Autotune Criteria

Mass Selective Detector Autotune Criteria

A standard autotune routine is performed on the mass selective detector (MSD) each day prior to sample analysis. The autotune report is evaluated for the following:

1. An unusual change in electron multiplier voltage
2. Peak width for tune masses should be between 0.4 amu and 0.6 amu
3. The relative abundance of tune mass 219.0 should be greater than 30% of tune mass 69.0.
4. Isotope abundance ratio for mass 70.0 should be between 0.54% and 1.6%.
Isotope abundance ratio for tune mass 220.0 should be between 3.2% and 5.4%.
5. Air leaks in the GC/MS system are checked by evaluating the levels of masses 28 and 18 (nitrogen and water).

If autotune criteria are not met the system should be evaluated for problems. After all system problems are resolved, the detector should be autotuned before sample analysis. File the autotune reports in the instrument autotune folder.

Appendix 5

Calibration Standard Preparation for Bromomethane and 1,3-Dichloropropene

Calibration Standard Preparation for Bromomethane and 1,3-Dichloropropene

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gasses and has the following specifications:

Cylinder # ALM057764

Expiration Date 11/17/00

Bromomethane 5.77 ppb/m (22,372 ng/m³)

Cis-1,3-dichloropropene 5.45 ppb/m (24,520 ng/m³)

Trans-1,3-dichloropropene 5.45 ppb/m (24,520 ng/m³)

The working analysis standard is prepared by diluting stock gas using the following procedure.

1. A six (6) liter canister is evacuated to -30 inches Hg
2. 692 ml of stock gas is transferred to the canister using a gas tight syringe
3. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter
4. The canister is pressurized to 29.4 psig with ultrapure nitrogen

The canister will contain the following concentrations:

bromomethane 861 ng/m³

cis-1,3-dichloropropene 953 ng/m³

trans-1,3-dichloropropene 953 ng/m³

The routine injection volume is 400 ml. The cryosampler is used to inject the volumes listed below. A calibration curve is generated using the equivalent concentrations listed for each compound.

Volume	Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
400 ml	861ng/m ³	953 ng/m ³	953 ng/m ³
200 ml	431ng/m ³	476 ng/m ³	476 ng/m ³
100 ml	215ng/m ³	238 ng/m ³	238 ng/m ³
50 ml	108ng/m ³	119 ng/m ³	119 ng/m ³
25 ml	54ng/m ³	60 ng/m ³	60 ng/m ³
15 ml	32ng/m ³	36 ng/m ³	36 ng/m ³

APPENDIX III

1,3-DICHLOROPROPENE CHARCOAL TUBE SAMPLE LABORATORY REPORT

California Environmental Protection Agency

Air Resources Board

1,3-Dichloropropene (Telone) Charcoal Tube Method Development and Analytical Results for Ambient Monitoring Samples

DATE: December 22, 2000

**Prepared by
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**Special Analysis Section
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Reviewed and Approved by

**Michael P. Spears, Manager
Special Analysis Section**

Project Number: C00-028

This report has been reviewed by staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names of commercial products constitute endorsement or recommendation for use.

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1.0 INTRODUCTION

The Department of Pesticide Regulation (DPR) requested the Air Resources Board (ARB) to conduct ambient air monitoring for 1,3-dichloropropene (Telone) using charcoal tube to compare with analysis by a canister method. Dichloropropene (DCP) is present as a mixture of the cis and trans isomer. This report covers the analytical and quality assurance results for the charcoal tube analysis of both cis and trans isomer of DCP for three (3) weeks in Kern County and one (1) week in Monterey County. The method estimated quantitation limit (EQL) is 9.11 ng/ml (27.3 ng/sample). Appendix 1 contains the final standard operating procedure (SOP) for dichloropropene.

2.0 METHOD DEVELOPMENT AND STANDARD OPERATING PROCEDURE.

2.1 Overview

Staff modified the method from the earlier procedure in two important issues. First a gas chromatograph with a mass selective detector (GC/MS) operating in the selected ion-monitoring mode to maximize sensitivity is used. Second, the exposed coconut based charcoal tube is extracted by sonication using three (3) ml of dichloromethane (DCM).

2.2 Instrument Reproducibility

Five individual injections of 1 μ l each were made of 1,3-dichloropropene at three concentrations in order to establish the reproducibility of the instrument. Table 1 shows the results for 10, 40, and 100 ng/ml with the average and standard deviation of the determined value and the responses for the isomers.

2.3 Calibration

Laboratory staff used standard concentrations of 10, 20, 40, 60 and 100 ng/ml to produce a 5-point calibration curve. The average r^2 for the cis isomer is 0.998 and for the trans isomer is 0.999. Staff calibrated the instrument before each analytical sample batch.

2.4. Minimum Detection Limit (MDL)

The method follows standard United States Environmental Protection Agency (USEPA) procedures to calculate the MDL. Using the analysis of seven low-level matrix spikes (10.0 ng/ml), the MDL and EQL for a 3 ml extract is calculated as follows:

s = the standard deviation of the concentration calculated for the seven replicate spikes.

For *trans*-1,3-dichloropropene: *s* = 0.58 ng/ml

$$MDL = (3.14) * (s) = (3.14) * (0.58) = 1.82 \text{ ng/ml}$$

$$EQL = (5) * (MDL) = (5) * (1.82) = 9.11 \text{ ng/ml}$$

$$EQL \text{ for total ng/sample} = 27.3 \text{ ng/sample}$$

For *cis*-1,3-dichloropropene: *s* = 0.51 ng/ml

$$MDL = (3.14) * (0.51) = 1.60 \text{ ng/ml}$$

$$EQL = (5) * (1.60) = 8.00 \text{ ng/ml}$$

$$EQL \text{ for ng/sample} = 24.0 \text{ ng/sample}$$

Staff report results above the EQL to three (3) significant figures. Results below the EQL but greater than or equal to the MDL are reported as detected (DET). Results less than MDL are reported as <MDL.

2.5. Collection and Extraction Efficiency (Recovery)

Six (6) charcoal sample tubes were used to determine method recovery. The primary section (front bed) of three (3) sample tubes were spiked with 20 ng/ml of DCP standard and three (3) others with 100 ng/ml. The spiked tubes were placed on field samplers and sampled at an airflow of 3 liters per minute (lpm) for 24 hours at ambient temperature. DCM was used to extract the primary section of the spiked tubes by sonication for 1 hour. Analysis of the extracts occurred after filtration. The table below presents the results.

DCP Spike	Mean Percent Recovery	RSD
20 ng	cis/trans: 108.1/102.8	7.1/6.2
100 ng	cis/trans: 101.9/100.3	4.2/3.3

2.6. Storage Stability

Staff completed storage stability studies previously. Since the collection procedure is identical, no further studies were required.

2.7. Breakthrough

Staff completed breakthrough studies in the previous study. The field sampling procedure is identical therefore, no further studies were required.

3.0 DICHLOROPROPENE AMBIENT AIR MONITORING SAMPLE RESULTS.

Extraction and analysis of all samples was complete within 7 days of receipt.

Kern County: The laboratory received a total of 80 ambient samples plus four (4) field spikes, three (3) blanks, and four (4) trip spikes from 07/10/00 to 07/27/00. Table 2 presents the results of the analysis of the dichloropropene ambient samples.

Monterey County: The laboratory received a total of 28 ambient samples plus two (2) field spikes and two (2) trip spikes from 09/11/00 to 09/15/00. Table 3 presents the Monterey county results.

4.0 ANALYTICAL QUALITY CONTROL SAMPLES

4.1 Laboratory solvent blanks

Staff analyze a laboratory solvent blank, which is the DCM for extraction and preparation of the standards, with each of the ambient analytical sample batches. Staff defines an analytical batch as the samples in an automated GC/MS analysis sequence. This is to insure there are no reagent interferences in the analysis. All blanks were less than the MDL.

4.2 Laboratory control blanks

Staff analyzed a laboratory control blank with each analytical batch. This is a charcoal tube prepared and analyzed as described for the ambient samples. Analysis did not detect DCP above the MDL in these samples.

4.3 Laboratory control spikes

Staff analyzed a laboratory control spike with each analytical batch. A control spike is a charcoal tube spiked with 20 ng/ml of DCP. This represents 9.6 ng/ml for the cis isomer and 9.8 ng/ml for the trans isomer. The control sample is prepared and analyzed as described for the samples. The recovery for Kern County averaged 8.61/8.41 ng/ml for the cis/trans isomers respectively, with a standard deviation of 0.30/0.34, respectively. The recovery for Monterey County averaged 9.35/9.46 ng/ml for the cis/trans isomer respectively, with a standard deviation of 0.78/0.74.

4.4 Calibration check standards

Following standard lab procedures, staff inserts a calibration check standard after the initial calibration and every tenth (10) sample in an analytical batch. The calibration check standard must be within $\pm 25\%$ of the target value. If any of the checks are outside the limit, the associated samples are re-analyzed. The calibration check for each analytical batch is 7.20 ng/ml for the cis isomer and 7.35 ng/ml for the trans isomer. For Kern County, the quantitation averaged 7.79 ng/ml for cis and 7.96 ng/ml for trans with a standard deviation of 0.52/0.67, respectively. For Monterey County the average was 6.99 ng/ml for the cis and 7.02 ng/ml for the trans with a standard deviation of 0.25/0.26, respectively.

4.5 Analytical Duplicates

No analytical duplicates were run with this analysis.

5.0 FIELD, TRIP, AND LABORATORY SPIKES AND TRIP BLANKS

For Kern County four (4) laboratory spikes, four (4) trip spikes, four (4) field spikes and three (3) trip blanks were analyzed for the ambient air DCP testing. All of the spikes were prepared at 20 ng/ml of DCP total on 07/07/00. This represents 9.6 ng/ml for the cis isomer and 9.8 ng/ml for the trans isomer. Monterey County had only two (2) field, trip and laboratory spikes prepared on 09/08/00. No trip blanks were returned with these samples.

5.1 *Laboratory spikes*

Table 4 presents the results of the laboratory spikes. The average DCP recovery for Kern County was 8.50/8.42 ng/ml (cis/trans) with a standard deviation of 0.38/0.36, respectively.

The average DCP recovery for Monterey County was 8.70/8.72ng/ml (cis/trans) with a standard deviation of 0.20 /0.45, respectively.

5.2 *Trip spikes*

Table 5 presents the results of the trip spikes. The average DCP recovery for Kern County was 9.05/8.97 ng/ml (cis/trans) with a standard deviation of 0.12/0.17, respectively.

The DCP recovery for Monterey County was 8.71/8.80 ng/ml (cis/trans) with standard deviation of 0.90/1.08, respectively.

5.3 *Field spikes*

The field spike results are reported in Table 6. The spikes for Kern County were placed on a sampler at the ARB ambient air monitoring station in Bakersfield. The average recovery of the field spikes for Kern County was 86.84/40.90 ng/ml (cis/trans) with a standard deviation of 2.73/0.84, respectively. The cis/trans quantitation for the ARB site run concurrently with the field spikes was 68.6/29.8 ng/ml indicating a high ambient background of the compound or possible interference from another source. In Monterey county, recovery was 207.9/113.9 ng/ml for the cis/trans isomer with a standard deviation of 2.5/1.4, respectively. These values are in line with the colocated site for the field samples. See the discussion in section 9.0 for more details.

5.4 *Trip blanks*

In Kern County three (3) trip blanks were received, one for each of the three weeks of ambient air monitoring (Table 7). All of these sample results are less than the MDL. For Monterey County, no trip blanks were designated for this study.

6.0 DISCUSSION

Kern County:

Analysis of the Kern County samples show dichloropropene present in concentrations exceeding the expected quantitation levels. The samples in many cases were diluted 10 to 100 times to come within the calibration range. The field spikes were sampled at the ARB Bakersfield station, which has a concentration of 30 ng/ml for the trans isomer alone. The field spikes were prepared at 20 ng/ml (this is 9.6 ng/ml for the cis isomer and 9.8 ng/ml for the trans isomer) and recovery was 40 ng/ml average for the trans isomer. The recoveries of the laboratory and trip spikes were approximately 86-88% of the expected value. This parallels the results of similar prepared spikes staff analyzed in the method development work at the Sacramento monitoring site. From this, it seems evident the higher value for the field spikes are indicative of the actual ambient air.

In greater than 70% of the samples, the cis isomer has area counts exceeding that expected for the cis/trans ratio. The DCP standard is prepared as total ng/ml, with the isomers specified at 48% cis and 49% trans. A similar ratio was expected for the field samples. In the analytical results there is a definite peak eluting about 0.05 minutes later than the cis-DCP. A full scan analysis identified the compound as methyl isothiocyanate (MITC), a breakdown product of metam-sodium. An analysis of a MITC standard confirmed the retention time and ion ratio. Based on earlier information from DPR on the EQL for MITC ($0.5 \mu\text{g}/\text{m}^3$) the expected concentration is $0.7 \mu\text{g}/\text{ml}$. MITC standards were prepared at 0.5 to $2.0 \mu\text{g}/\text{ml}$. The analysis of samples received during the first week of sampling showed MITC at high concentrations. Analysis of the remaining samples occurred using a calibration of 1.0 to $10.0 \mu\text{g}/\text{ml}$. The MITC results are included in Table 2, however, it is important to note that this data is based on an unvalidated method and should be considered as an estimate of actual MITC concentration. The presence of the MITC correlates with a large response area and asymmetric peak shape for the cis-DCP isomer. Since MITC was not one of the target compounds, no method validation (extraction/sampling recoveries, etc) or quality control work (laboratory control spikes, etc) were performed for MITC. A previous report and analysis of MITC used charcoal tube and gas chromatography with nitrogen detector. The field-sampling rate for the earlier study was 1.0 lpm (compared with the current 3 lpm). For future analysis of DCP further method development will be necessary to insure separation of the compounds and obtain a more accurate quantitation.

An analysis of the secondary beds (back beds) of the charcoal tubes was completed for a selected group of samples that had high DCP concentrations. These samples included CRS5#41, CRS6#47, CRS7#54, CRS7D#55, and CRS8#65. In this case, the cis isomer appeared to be selectively retained on the secondary charcoal bed with concentrations 20 to 300 ng/ml. Analysis of the secondary bed for other sites had DCP at <MDL. MITC was not present in the secondary bed. It was either not retained, due to high sampling flow-rate or it was completely retained on the primary bed.

For the Kern county data, the trans isomer is the more reliable quantitation. The cis isomer is an estimate due to the interference of the MITC. The trans is probably a good indicator of the cis concentration based on the assumption of a near 50/50 mix of the application. The MITC values are estimates, again due to interferences from the cis isomer of DCP and the fact that preliminary work in the laboratory was not done at the specified flow rate or extraction efficiencies.

Monterey County:

The Monterey sampling occurred for one (1) week concurrent with the canister sampling. Although not nearly as high as the Kern county results, the sites still indicate concentrations of DCP well above the EQL requested. The dilutions required for these sites were approximately 5 and 10 times. The Monterey county results show selectively higher cis concentrations. Analysis detected no MITC at the Monterey sites.

TABLE 1: Instrument Reproducibility

Amount (ng/ml)	cis-dichloropropene		trans-dichloropropene	
	Area Response	ng/ml	Area Response	ng/ml
10 (4.8/4.9)	684	4.72	628	4.74
	672	4.62	629	4.75
	681	4.69	681	5.17
	680	4.68	692	5.26
	684	4.72	669	5.08
Average Standard Dev.	680	4.69	660	5.00
	4.9	0.04	29.7	0.24
40 (19.2/19.6)	2584	19.06	2472	19.69
	2599	19.18	2431	19.36
	2535	18.69	2394	19.06
	2530	18.66	2396	19.08
	2528	18.64	2405	19.15
Average Standard Dev.	2555	18.85	2420	19.27
	33.7	0.25	32.8	0.26
100 (48.0/49.0)	6559	49.08	6282	50.58
	6581	49.25	6217	50.05
	6582	49.26	6292	50.66
	6604	49.42	6294	50.68
	6558	48.72	6284	49.77
Average Standard Dev.	6577	49.15	6274	50.50
	19.1	0.27	32.2	0.41

Table 2. Kern County Ambient Monitoring Results

Site	Date	ID	Count	Date	PM ₁₀	PM _{2.5}	SO ₂
ARB	7/10/00	ARB-1	1	7/17/00	2.06E+02	8.97E+01	2.49E+03
	7/11/00	ARB-2	11	7/17/00	1.42E+02	4.77E+01	DET
	7/12/00	ARB-3	17	7/18/00	5.88E+01	4.56E+01	DET
	7/12/00	ARB-3D	18	7/18/00	5.58E+01	4.14E+01	DET
	7/13/00	ARB-4	29	7/19/00	4.77E+02	1.46E+02	4.56E+03
	7/17/00	ARB-5	40	7/25/00	2.38E+02	2.79E+02	4.38E+03
	7/18/00	ARB-6	46	7/25/00	3.53E+03	1.54E+03	1.25E+04
	7/19/00	ARB-7	52	7/25/00	6.90E+03	3.98E+03	1.55E+04
	7/19/00	ARB-7D	53	7/25/00	7.00E+03	3.99E+03	1.61E+04
	7/20/00	ARB-8	64	7/26/00	5.95E+03	3.70E+03	7.26E+03
	7/24/00	ARB9	72	8/1/00	4.05E+03	2.65E+03	6.81E+03
	7/25/00	ARB10	78	8/1/00	2.87E+03	1.88E+03	1.31E+04
	7/26/00	ARB11	84	8/1/00	2.69E+03	1.16E+03	9.87E+03
	7/26/00	ARB11D	85	8/1/00	3.01E+03	1.26E+03	1.11E+04
	7/27/00	ARB12	96	8/2/00	3.84E+03	1.80E+03	2.08E+04

Site	Date	ID	Count	Date	PM ₁₀	PM _{2.5}	SO ₂
CRS	7/10/00	CRS-1	6	7/17/00	7.71E+02	1.08E+03	DET
	7/11/00	CRS-2	12	7/17/00	1.23E+02	1.71E+02	DET
	7/12/00	CRS-3	19	7/18/00	8.67E+01	1.05E+02	DET
	7/12/00	CRS-3D	20	7/18/00	8.68E+01	1.09E+02	DET
	7/13/00	CRS-4	30	7/19/00	2.72E+02	3.21E+02	DET
	7/17/00	CRS-5	41	7/25/00	1.06E+05	7.37E+04	5.64E+03
	7/18/00	CRS-6	47	7/25/00	2.40E+05	2.31E+05	1.18E+04
	7/19/00	CRS-7	54	7/25/00	1.70E+05	1.82E+05	7.74E+03
	7/19/00	CRS-7D	55	7/25/00	1.43E+05	1.51E+05	6.78E+03
	7/20/00	CRS-8	65	7/26/00	4.83E+04	5.21E+04	4.64E+04
	7/24/00	CRS9	73	8/1/00	1.01E+03	1.26E+03	2.70E+03
	7/25/00	CRS10	79	8/1/00	1.98E+03	2.36E+03	3.18E+03
	7/26/00	CRS11	86	8/1/00	1.83E+03	1.95E+03	DET
	7/26/00	CRS11D	87	8/1/00	2.00E+03	2.10E+03	DET
	7/27/00	CRS12	97	8/2/00	6.84E+03	6.78E+03	DET

Table 2. Kern County Ambient Monitoring Results Continued

Station	Date	Sample	Depth	Anal	Unit	Value	Unit
SHA	7/10/00	SHA-1	7	7/17/00	2.78E+03	3.11E+03	DET
	7/11/00	SHA-2	13	7/17/00	1.56E+03	1.79E+03	DET
	7/12/00	SHA-3	21	7/18/00	8.33E+01	8.53E+01	DET
	7/12/00	SHA-3D	22	7/18/00	8.62E+01	8.72E+01	DET
	7/13/00	SHA-4	31	7/19/00	1.20E+02	9.64E+01	DET
	7/17/00	SHA-5	42	7/25/00	1.12E+04	7.46E+03	DET
	7/18/00	SHA-6	48	7/25/00	5.44E+03	4.61E+03	DET
	7/19/00	SHA-7	56	7/26/00	2.44E+03	3.21E+03	2.45E+04
	7/19/00	SHA-7D	57	7/26/00	1.92E+03	3.04E+03	2.58E+04
	7/20/00	SHA-8	66	7/26/00	5.49E+03	2.75E+03	4.92E+04
	7/24/00	SHA9	74	8/1/00	1.03E+03	4.65E+02	7.62E+03
	7/25/00	SHA10	80	8/1/00	5.01E+03	4.83E+03	2.79E+03
	7/26/00	SHA11	88	8/2/00	1.31E+03	1.35E+03	DET
	7/26/00	SHA11D	89	8/2/00	1.34E+03	1.38E+03	DET
	7/27/00	SHA12	98	8/2/00	1.89E+03	1.67E+03	DET

Station	Date	Sample	Depth	Anal	Unit	Value	Unit
MVS	7/10/00	MVS-1	8	7/17/00	1.48E+03	8.31E+01	2.29E+04
	7/11/00	MVS-2	14	7/17/00	6.11E+02	2.07E+01	9.87E+03
	7/12/00	MVS-3	23	7/18/00	1.37E+03	5.35E+01	2.02E+04
	7/12/00	MVS-3D	24	7/18/00	1.38E+03	5.45E+01	1.99E+04
	7/13/00	MVS-4	32	7/19/00	2.22E+04	1.34E+04	2.81E+04
	7/17/00	MVS-5	43	7/25/00	1.09E+03	5.94E+02	8.91E+03
	7/18/00	MVS-6	49	7/25/00	1.14E+03	5.28E+02	9.42E+03
	7/19/00	MVS-7	58	7/26/00	8.28E+02	3.24E+02	8.22E+03
	7/19/00	MVS-7D	59	7/26/00	9.99E+02	3.72E+02	8.79E+03
	7/20/00	MVS-8	67	7/26/00	3.37E+03	2.02E+03	5.64E+03
	7/24/00	MVS9	75	8/1/00	NA	NA	NA
	7/25/00	MVS10	81	8/1/00	3.17E+03	1.76E+03	2.20E+04
	7/26/00	MVS11	90	8/2/00	1.52E+03	5.76E+02	1.24E+04
	7/26/00	MVS11D	91	8/2/00	1.49E+03	5.91E+02	1.16E+04
	7/27/00	MVS12	99	8/2/00	1.46E+03	2.87E+02	1.88E+04

Table 2. Kern County Ambient Monitoring Results Continued

VSD	7/10/00	VSD-1	9	7/17/00	2.27E+03	7.60E+01	3.53E+04
	7/11/00	VSD-2	15	7/17/00	3.49E+03	3.33E+01	5.42E+04
	7/12/00	VSD-3	25	7/18/00	2.78E+03	8.95E+01	4.03E+04
	7/12/00	VSD-3D	26	7/18/00	2.83E+03	9.25E+01	3.99E+04
	7/13/00	VSD-4	33	7/19/00	7.89E+02	1.68E+02	7.53E+03
	7/17/00	VSD-5	44	7/25/00	4.84E+02	1.54E+02	5.01E+03
	7/18/00	VSD-6	50	7/25/00	7.66E+02	2.22E+01	1.22E+04
	7/19/00	VSD-7	60	7/26/00	1.35E+03	9.75E+01	1.64E+04
	7/19/00	VSD-7D	61	7/26/00	1.38E+03	9.53E+01	1.68E+04
	7/20/00	VSD-8	68	7/26/00	1.32E+04	7.87E+03	1.43E+04
	7/24/00	VSD9	76	8/1/00	2.26E+04	1.61E+04	1.16E+04
	7/25/00	VSD10	82	8/1/00	2.35E+03	1.86E+03	7.89E+03
	7/26/00	VSD11	92	8/2/00	9.27E+02	4.08E+02	9.03E+03
	7/26/00	VSD11D	93	8/2/00	1.02E+03	4.56E+02	9.63E+03
	7/27/00	VSD12	100	8/2/00	2.03E+03	5.22E+02	2.39E+04
MET	7/10/00	MET-1	10	7/17/00	8.44E+02	DET	1.36E+04
	7/11/00	MET-2	16	7/17/00	8.09E+01	DET	DET
	7/12/00	MET-3	27	7/18/00	6.32E+03	9.50E+01	9.26E+04
	7/12/00	MET-3D	28	7/18/00	7.62E+03	1.12E+02	1.08E+05
	7/13/00	MET-4	35	7/19/00	1.32E+03	8.21E+01	1.75E+04
	7/17/00	MET-5	45	7/25/00	3.11E+02	5.30E+01	3.66E+03
	7/18/00	MET-6	51	7/25/00	1.33E+02	DET	2.70E+03
	7/19/00	MET-7	62	7/26/00	2.95E+02	DET	4.41E+03
	7/19/00	MET-7D	63	7/26/00	3.28E+02	DET	4.80E+03
	7/20/00	MET-8	69	7/26/00	3.80E+03	2.17E+03	4.59E+03
	7/24/00	MET9	77	8/1/00	1.17E+02	1.36E+02	DET
	7/25/00	MET10	83	8/1/00	3.94E+02	1.23E+02	4.23E+03
	7/26/00	MET11	94	8/2/00	5.29E+02	9.20E+01	6.21E+03
	7/26/00	MET11D	95	8/2/00	5.68E+02	9.54E+01	6.60E+03
	7/27/00	MET12	101	8/2/00	6.01E+04	2.62E+04	1.25E+04

1. Data results for MITC should be considered an unvalidated estimate.

Table 2 Notes: Kern County Ambient Monitoring

Sample MVS9#75: No field sample taken.

If analysis result is \geq MDL and $<$ EQL it is reported in the table as detected (DET). Levels \geq EQL are reported as the actual measured value and are reported to three significant figures.

$<$ MDL= Less than 4.80 ng/sample cis-DCP isomer

$<$ MDL= Less than 5.46 ng/sample trans-DCP isomer

$<$ MDL= Less than 432 ng/sample for MITC

Det = cis-DCP amount \geq 4.80 ng/sample (MDL) and $<$ 24.0 ng/sample (EQL).

Det = trans-DCP amount \geq 5.46 ng/sample (MDL) and $<$ 27.3 ng/sample (EQL)

Det = MITC \geq 432 ng/sample (MDL) and $<$ 2.16 $\times 10^3$ ng/sample (EQL)

Site location i.d.:

ARB: Bakersfield Station

CRS: Cotton Research Station

SHA: Shafter-ARB Station

MVS: Mountain View School

VSD: Vineland School District

MET: Mettler Fire Station

Table 3: Monterey County Ambient Monitoring Results

SAL	9/11	SAL-T1	3	9/18	5.63E+02	2.95E+02
	9/12	SAL-T2	**	9/18	NA	NA
	9/13	SAL-T3	14	9/19	1.62E+02	7.61E+01
	9/13	SAL-T3D	15	9/19	1.57E+02	7.42E+01
	9/14	SAL-T4	26	9/19	<MDL	<MDL
OAS	9/11	OAS-T1	4	9/18	8.27E+02	5.35E+02
	9/12	OAS-T2	9	9/18	1.59E+03	9.23E+02
	9/13	OAS-T3	16	9/19	2.39E+03	1.20E+03
	9/13	OAS-T3D	17	9/19	2.00E+03	1.00E+03
	9/14	OAS-T4	27	9/19	8.95E+02	5.59E+02
CHU	9/11	CHU-T1	5	9/18	4.05E+03	2.13E+03
	9/12	CHU-T2	10	9/18	1.01E+04	5.45E+03
	9/13	CHU-T3	18	9/19	2.58E+03	2.31E+03
	9/13	CHU-T3D	19	9/19	2.83E+03	2.56E+03
	9/14	CHU-T4	28	9/19	9.81E+00	8.76E+00
LJE	9/11	LJE-T1	6	9/18	2.65E+02	1.31E+02
	9/12	LJE-T2	11	9/18	5.56E+02	2.99E+02
	9/13	LJE-T3	20	9/19	4.40E+01	3.04E+01
	9/13	LJE-T3D	21	9/19	4.55E+01	3.15E+01
	9/14	LJE-T4	29	9/19	1.04E+01	8.76E+00
PMS	9/11	PMS-T1	7	9/18	9.07E+02	5.79E+02
	9/12	PMS-T2	12	9/18	9.64E+02	6.69E+02
	9/13	PMS-T3	22	9/19	3.88E+01	3.24E+01
	9/13	PMS-T3D	23	9/19	3.94E+01	3.23E+01
	9/14	PMS-T4	30	9/19	1.01E+03	7.94E+02
SES	9/11	SES-T1	8	9/18	2.82E+02	2.07E+02
	9/12	SES-T2	13	9/18	5.32E+02	3.59E+02
	9/13	SES-T3	24	9/19	9.14E+01	7.21E+01
	9/13	SES-T3D	25	9/19	9.06E+01	7.15E+01
	9/14	SES-T4	31	9/19	5.74E+02	4.64E+02

Table 3 Notes: Monterey County Monitoring

Sample SALT2: No field sample taken.

If analysis result is \geq MDL and $<$ EQL it is reported in the table as detected (DET).
Levels \geq EQL are reported as the actual measured value and are reported to three significant figures.

$<$ MDL= Less than 4.80 ng/sample cis-DCP isomer
 $<$ MDL= Less than 5.46 ng/sample trans-DCP isomer

Det = cis-DCP amount \geq 4.80 ng/sample (MDL) and $<$ 24.0 ng/sample (EQL).
Det = trans-DCP amount \geq 5.46 ng/sample (MDL) and $<$ 27.3 ng/sample (EQL)

Site location i.d.:
SAL: APCD monitoring site in Salinas
OAS: Oak Avenue School
CHU: Chualar School
LJE: La Joya Elementary School
PMS: Pajaro Middle School
SES: Salsipuedes Elementary School

Table 4: Laboratory Spike Results

Sample #	Date Analyzed	cis, ng/ml (percent Recovery)	trans, ng/ml (percent Recovery)
Kern County		(9.6 ng/ml)	(9.8 ng/ml)
LS-1	07/17/00	8.09	8.17
LS-2	07/18/00	9.01	8.96
LS-3	07/19/00	8.43	8.30
LS-4	07/19/00	8.45	8.25
Monterey County			
LS-1	09/18/00	8.84	9.04
LS-2	09/19/00	8.56	8.40

Table 5: Trip Spike Results

Sample #	Date Analyzed	cis, ng/ml (percent Recovery)	trans, ng/ml (percent Recovery)
Kern County		(9.6 ng/ml)	(9.8 ng/ml)
TS-1#36	07/19/00	8.92 (83%)	8.87 (90%)
TS-2#37	07/19/00	9.17 (91%)	9.17 (94%)
TS-3#38	07/19/00	8.97 (85%)	8.80 (90%)
TS-4#39	07/19/00	9.12 (84%)	9.04 (92%)
Monterey County			
TS-1	09/18/00	9.34 (97%)	9.56 (96%)
TS-2	09/19/00	8.07 (84%)	8.03 (82%)

Table 6: Field Spike Results

Sample #	Date Analyzed	cis, ng/ml (percent Recovery)	trans, ng/ml (percent Recovery)
Kern County		(9.6 ng/ml)	(9.8 ng/ml)
FS-1#2	07/17/00	89.9 (222%)	40.6 (110%)
FS-2#3	07/17/00	88.3 (205%)	40.6 (110%)
FS-3#4	07/17/00	84.3 (163%)	40.2 (106%)
FS-4#5	07/17/00	84.7 (167%)	42.1 (123%)
Monterey County			
FS-1	09/18/00	202 (156%)	113
FS-2	09/18/00	189 (80%)	115

Note: Percent Recovery was corrected by subtracting background.

Table 7: Trip Blank Results for Kern County

Sample #	Date Analyzed	cis, ng/ml	trans, ng/ml
Blank #34	07/19/00	<MDL	<MDL
Blank #70	07/26/00	<MDL	<MDL
Blank #71	08/01/00	<MDL	<MDL

Appendix: Standard Operating Procedure for 1,3-Dichloropropene

California Environmental Protection Agency



**Standard Operating Procedure
Sampling and Analysis of cis/trans-1,3-dichloropropene
(Telone) in Ambient Air using Gas
Chromatography/Mass Selective Detector**

**Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division**

07/10/00 version 1

Approved by:
Michael P. Spears, Manager
Special Analysis Section

Standard Operating Procedure for the Sampling and Analysis of cis/trans-1,3-dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector

1.0 SCOPE

The current method is modified from the previous procedure (ARB, 1994, 1996) using a gas chromatograph/mass selective detector for the determination of cis/trans-1,3-dichloropropene (Telone) from ambient air samples. Another modification replaces carbon disulfide with dichloromethane (DCM) as the extraction solvent.

2.0 SUMMARY OF METHOD

Coconut based charcoal tubes are placed on the sampler for 24 hours at 3.0 liters per minute (LPM) flow rate. The samples are stored in an ice chest or refrigerator until extracted with 3 ml of DCM. The injection volume is 1 μ l. A gas chromatograph with a mass selective detector in the selected ion monitoring (SIM) mode is used for analysis.

3.0 INTERFERENCES/LIMITATIONS

Method interferences may be caused by contaminants in solvents, reagents, glassware and other processing apparatus that can lead to discrete artifacts or elevated baselines. A method blank must be done with each batch of samples to detect any possible method interferences.

It became apparent after method development and during the sample analysis that Methyl Isocyanate (MITC) interferes with the analytical results for cis-DCP. There is a definite peak eluting about 0.05 minutes later than the cis-DCP. A full scan analysis identified the compound as methyl isothiocyanate (MITC), a breakdown product of metam-sodium. An analysis of a MITC standard confirmed the retention time and ion ratio. For future analysis of DCP further method development and modification of this SOP will be necessary to insure separation of the compounds and obtain a more accurate quantitation if MITC is present in the sample.

4.0 EQUIPMENT AND CONDITIONS

4.1 Instrumentation

Hewlett-Packard 6890 Series gas chromatograph
Hewlett-Packard 5973 Network mass selective detector
MS Transfer line: 280° C

Injector: 200 °C, Splitless, Liner 4 mm straight liner with glass wool.
Column: J&W Scientific DB-VRX, 60 meter, 250 μ m i.d., 1.4 μ m film thickness.

Standard Operating Procedure for the Sampling and Analysis of cis/trans-1,3-dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector

GC Temperature Program: Oven initial 40 °C, hold 4 min. Ramp to 220 °C @ 12 °C/min., hold 1 min. Retention time: cis-DCP= 11.63 min., trans-DCP= 12.10 min.

Splitter open @ 1.0 min.

Flows: Column: He, 2.0 ml/min, 30 psi. (velocity: 37 cm/sec)

Splitter: 50 ml/min.

Mass Spectrometer: Electron Ionization

Selective Ion Monitoring: dichloropropene, 75 (quant. ion 100%), 110 (qual. ion 20%) Tuning: PFTBA on masses 69, 219, 502.

4.2 Auxiliary Apparatus

1. Precleaned vials, 8 ml capacity with teflon caps.
2. Whatman filters, 0.45 µm
3. Disposable syringes, 3 ml
4. Sonicator
5. GC vials with septum caps.

4.3 Reagents

1. Dichloromethane, Pesticide grade or better.
2. 1,3 -Dichloropropene (cis- and trans- mixture), Chem Service PS- 1 52, 99 (+) % or equiv.
3. Coconut charcoal sorbent tubes, SKC, Fullerton, CA #226-09.

5.0 ANALYSIS OF SAMPLES

- 5.1 A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses: 69,219,502. The criterion for the tune are the peak widths at ½ the peak height, 0.60 ± 0.05 , and the criteria for relative abundance: 69:100%, 219:100-120%, and 502: 7-12%.
- 5.2 It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interference's. A solvent blank must be analyzed after any sample which results in possible carry-over contamination.
- 5.3 A 5-point calibration curve shall be analyzed with each batch of samples
- 5.4 With each batch of samples analyzed a laboratory blank and a laboratory control spike will be run concurrently. A blank charcoal tube is prepared and analyzed the same way as the samples. A laboratory control spike is charcoal spiked with

Standard Operating Procedure for the Sampling and Analysis of cis/trans-1,3-dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector

a known amount of standard. The laboratory control sample is prepared and analyzed the same way as the samples. Laboratory check samples should have recoveries that are at least 70% of the theoretical spiked value.

- 5.5 A calibration check standard of 15 ng/ml is run after the initial calibration and every 10 samples and at the end of the analytical sequence. The value of the check must be $\pm 25\%$ of the expected value. If the calibration check falls outside these limits then those samples associated with the out of limit calibration checks need to be reanalyzed.
- 5.6 Score and snap the sample tube, transfer the charcoal from the primary section (front bed) into a 8 ml vial. (Save the back-up bed for future analysis if necessary.) Rinse the tube with 3.0 ml of DCM into the extraction vial. Cap and place the vial in the sonicator for 1 hour.
- 5.7 Filter the samples using a 3 ml syringe and 0.45 μm filter directly into a gc vial and cap securely.
- 5.8 The sample concentration is calculated according to:

$$\text{Conc (ng/m}^3\text{)} = (\text{Extract Conc (ng/ml)} \times 3 \text{ ml} / \text{Air Volume Sampled, (m}^3\text{)})$$

6.0 QUALITY ASSURANCE

6.1 Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows: Inject 1.0 μl 5 times of a dichloropropene standard prepared at three concentrations (low, mid, and high range). Table 1 shows the instrument reproducibility for 10 ng/ml, 40 ng/ml and 100 ng/ml with the average and standard deviation of the determined value and the area response.

6.2 Calibration

A five-point calibration curve was made at 10, 20, 40, 60 and 100 ng/ml. The regression is linear over this range with $r^2 = 0.999$.

6.3 Calibration Check Standard

A calibration check standard is run after the initial calibration and then every 10 samples and at the end to verify the system is in calibration. The value of the check must be $\pm 25\%$ of the expected value. If the calibration check falls outside

Standard Operating Procedure for the Sampling and Analysis of cis/trans-1,3-dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector

these limits then those samples associated with the out of limit calibration checks need to be reanalyzed.

6.4 Minimum Detection Limit

Detection limits is based on US EPA MDL calculation. Using the analysis of seven (7) replicates of a low-level matrix spike, the method detection limit (MDL) and the estimated quantitation limit (EQL) for 1,3-dichloropropene (total) is calculated by: $MDL = 3.14 \times (\text{std dev values})$ where std dev equals the standard deviation of the concentration calculated for the seven replicate spikes. The $EQL = 5 \times MDL$. Results are reported to 3 significant figures if above the EQL. Results below the EQL are reported as DET (detected) and results less than the MDL are reported as <MDL.

6.5 Collection and Extraction Efficiency (Recovery)

Dichloropropene at a low and high level are spiked on charcoal tubes (3 at each concentration). The spiked tubes are placed on field samplers with airflows of 3 liters per minute for 24 hours. The samples are extracted with DCM and prepared as described in section 5.6 and 5.7. The average percent recovery of dichloropropene should be $\pm 20\%$ of the expected value.

6.6 Storage Stability

Storage stability studies were completed in the previous study and not continued further here. The recovery of 1.0 μg dichloropropene at 11 days was 76% and recovery at 38 days 66%. All analyzes were completed within 2 days of receipt.

6.7 Breakthrough

No breakthrough analysis was done with this monitoring, the previous study at concentrations of 600-700 μg dichloropropene detected none in the secondary bed.

6.8 Safety

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure.

Standard Operating Procedure for the Sampling and Analysis of cis/trans-1,3-dichloropropene (Telone) in Ambient Air using Gas Chromatography/Mass Selective Detector

Table 1: Instrument Reproducibility

Standard is 48% cis and 49% trans isomers.

Amount (ng/ml)	Cis Area response	ng/ml	Trans Area response	ng/ml
10 (4.8/4.9)	684	4.72	628	4.74
	672	4.62	629	4.75
	681	4.69	681	5.17
	680	4.68	692	5.26
	684	4.72	669	5.08
Average	680	4.69	660	5.00
Standard Dev.	4.9	0.04	29.7	0.24
40 (19.2/19.6)	2584	19.06	2472	19.69
	2599	19.18	2431	19.36
	2535	18.69	2394	19.06
	2530	18.66	2396	19.08
	2528	18.64	2405	19.15
Average	2555	18.85	2420	19.27
Standard Dev.	33.7	0.25	32.8	0.26
100 (48.0/49.0)	6559	49.08	6282	50.58
	6581	49.25	6217	50.05
	6582	49.26	6292	50.66
	6604	49.42	6294	50.68
	6558	48.72	6284	49.77
Average	6577	49.15	6274	50.5
Standard Dev.	19.1	0.27	32.2	0.41

APPENDIX IV

METHYL BROMIDE CHARCOAL TUBE
SAMPLE LABORATORY REPORT

Date of Report: 1941/1/20

Matrix : Charcoal tube

ND is not detected.

by :Paul Lee

Date Approved:

For the sample set with the following log #s 10, 11, 22, 23, 29, 4, 24, 14, 15, 31

California Department of Food and Agriculture
Center for Analytical Chemistry
Environmental Monitoring Laboratory

Date of Report: 10/11/00

QUALITY CONTROL and Sample DATA

Matrix: Charcoal tube

CDFA LAB No.	ARB Sample Log No.'s	Analyte	Spike Level (microgram)	Result (microgram)	Recovery (%)	Reporting Limit (microgram)
2000-1348	3(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1355	20(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1356	21(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1362	23(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1367	34(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1372	35(A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1368	35(A)	Methyl Bromide		0.91		0.2
2000-1369	36(A)	Methyl Bromide		0.92		0.2
2000-1370	37(A)	Methyl Bromide		0.94		0.2
2000-1371	38(A)	Methyl Bromide		0.90		0.2
2000-1430	Blank(A)	Methyl Bromide		ND		0.2
2000-1431	B	Methyl Bromide		ND		0.2
2000-1432	Spike (A)	Methyl Bromide	5.000	3.96	79.2%	0.2
2000-1433	B	Methyl Bromide	1.000	0.770	77.0%	0.2

ND is not detected.

Extraction Date : 10/4/00

Analysis Date : 10/4/00

by : Young La

by : Paul Lee

Supervisor Approval: *[Signature]*

Date Approved: *[Signature]*

REMARKS

**California Department of Food and Agriculture
Center for Analytical Chemistry
Environmental Monitoring Laboratory**

Date of Report: 10/11/00

QUALITY CONTROL and Sample DATA

Matrix: Charcoal tube

CDFA LAB No.	ARB Sample Log No.'s	Analyte	Spike Level (microgram)	Result (microgram)	Recovery (%)	Reporting Limit (microgram)
2000-1353	16(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1354	17(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1360	26(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1365	32(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1347	7(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1357	27(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1366	33(A)	Methyl Bromide				0.2
	B	Methyl Bromide				0.2
2000-1434	Blank(A)	Methyl Bromide		ND		0.2
2000-1435	B	Methyl Bromide		ND		0.2
2000-1436	Spike(A)	Methyl Bromide	5.000	3.80	76.0%	0.2
2000-1437	B	Methyl Bromide	1.000	0.78	78.0%	0.2

ND is not detected.

Extraction Date: 10/3/00

by: Irene Aguiar

Supervisor Approval: *[Signature]*

Analysis Date: 10/3/00

by: Paul Lee *[Signature]*

Date Approved: *10/11/00*

REMARKS

Note: In the past, all sample tubes were labelled individually. This time one of our student assistants did not realize the charcoal tubes were not labelled. She took out all the samples assigned to her from labelled packages. So, the identities of this sample set were lost. The sample log #s in this set are 16, 17, 26, 32, 27, 33. However, I analyzed all of them and found 0.2 ug methyl bromide in one A-tube, trace amount in two A-tubes, none detected in 4 A-tubes and none detected in all 7 B-tubes.

California Department of Food and Agriculture
Center for Analytical Chemistry
Environmental Monitoring Laboratory

Date of Report: 10/11/90

Sample DATA

Matrix: Charcoal tube

CDFP LAB No.	ARB Sample Log No.'s	Analyte	Spike Level (microgram)	Result (microgram)	Recovery (%)	Reporting Limit (microgram)
2000-1349	10 (A)	Methyl Bromide		0.97		0.2
	B	Methyl Bromide		Trace		0.2
2000-1350	11 (A)	Methyl Bromide		0.370		0.2
	B	Methyl Bromide		Trace		0.2
2000-1357	22 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1358	23 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1363	29 (A)	Methyl Bromide		Trace		0.2
	B	Methyl Bromide		ND		0.2
2000-1348	31 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1359	24 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1351	14 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1352	15 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2
2000-1364	31 (A)	Methyl Bromide		ND		0.2
	B	Methyl Bromide		ND		0.2

ND is not detected.

Extraction Date: 10/3/90

by: Paul Lee & Hsiao Fang

Supervisor Approval: *[Signature]*

Analysis Date: 10/3/90

by: Paul Lee *[Signature]*

Date Approved: *[Signature]*

REMARKS

APPENDIX V

DPR's AIR MONITORING RECOMMENDATIONS FOR METHYL BROMIDE AND 1,3-DICHLOROPROPENE



Paul E. Helliker
Director

Department of Pesticide Regulation



Gray Davis
Governor
Winston H. Hickox
Secretary, California
Environmental
Protection Agency

MEMORANDUM

TO: George Lew, Branch Chief
Engineering and Laboratory Branch
Air Resources Board
P.O. Box 2815
Sacramento, California 95812

FROM: John S. Sanders, Ph.D. *John S. Sanders*
Chief
Environmental Monitoring and
Pest Management Branch

DATE: June 16, 2000

SUBJECT: RECOMMENDATION FOR 1,3-DICHLOROPROPENE AND METHYL
BROMIDE MONITORING FOR THE TOXIC AIR CONTAMINANT
PROGRAM

Enclosed is the staff recommendation for 1,3-dichloropropene and methyl bromide monitoring in 2000. As we discussed on May 30, due to analytical problems, you should postpone the monitoring for chloropicrin and metam-sodium breakdown products until 2001.

Good luck on the monitoring. If you have any questions, please feel free to contact me or you may call Randy Segawa, of my staff, at 916-324-4137.

cc: Randy Segawa
Kevin Mongar
Lynn Baker
Pam Wales (1807 files)



Staff Report

Use Information and Air Monitoring
Recommendation for the Pesticide Active Ingredients
1,3-Dichloropropene and Methyl Bromide

June 2000

By
Johanna Walters
Environmental Research Scientist
and
Pam Wales
Assistant Information Systems Analyst



ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM

STATE OF CALIFORNIA
Environmental Protection Program
Department of Pesticide Regulation
Environmental Monitoring and Pest Management Branch
830 K Street
Sacramento, California 95814-3510

**USE INFORMATION AND AIR MONITORING RECOMMENDATION
FOR THE PESTICIDE ACTIVE INGREDIENTS
1,3-DICHLOROPROPENE AND METHYL BROMIDE**

A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties and the historical uses of 1,3-dichloropropene and methyl bromide. The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

1,3-Dichloropropene

Table 1 describes some of the physical-chemical properties of 1,3-dichloropropene.

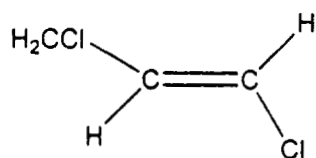
Table 1. Some Physical-Chemical Properties of 1,3-dichloropropene.

Chemical name	(EZ)-1,3-dichloropropene
Common name	1,3-dichloropropene
Some tradenames†	Telone II, Tri-Form
CAS number	542-75-6
Molecular formula	C ₃ H ₄ Cl ₂
Molecular weight	111.0
Form	Colorless-to-amber liquid with sweet penetrating odor (Tomlin, 1997)
Solubility	Water: 2 g/L at 20°C (Tomlin, 1997)
Vapor pressure	3.43 X 10 ¹ mmHg at 25°C (Kollman and Segawa, 1995)
Henry's Law Constant (KH)	2.29 X 10 ⁻³ atm-m ³ / mole at 25°C (Kollman and Segawa, 1995)
Soil adsorption Coefficient (Kd)	3.91 X 10 ⁻¹ g/cm ³ (Kollman and Segawa, 1995)
Aerobic soil metabolism half-life	11.5 to 53.9 days (Kollman and Segawa, 1995)
Anaerobic soil metabolism half-life	2.5 days at 25°C (Tomlin, 1997)

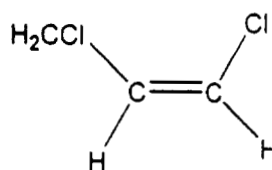
The technical product is a mixture of approximately equal quantities of (*E*)- and (*Z*)- isomers (figures 1a and 1b), of which the (*Z*) isomer is more nematocidally active (Tomlin, 1997). In soil, 1,3-dichloropropene undergoes hydrolysis to the respective 3-chloroallyl alcohols and is considered non persistent. The chemical is phytotoxic to plants and is rapidly metabolized to normal plant constituents (Tomlin, 1997).

† **Disclaimer:** The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such products.

Figure 1. The chemical structures of the 1,3-dichloropropene isomers.



(a) E-1-3-dichloropropene



(b) Z-1-3-dichloropropene

1,3-Dichloropropene is reported to hydrolyze to 3-chloro-2-propen-1-ol, which may be biologically oxidized to 3-chloropropenoic acid (Montgomery, 1997). Breakdown of this chemical eventually yields carbon dioxide (Connors *et al.*, 1990). Chloroacetaldehyde, formyl chloride, and chloroacetic acid are formed from the ozonation of 1,3-dichloropropene at 25°C and 730 mmHg (Tuazon *et al.*, 1984).

1,3-Dichloropropene has an LC₅₀ (96 hour) of 3.9 mg/L for rainbow trout and 7.1 mg/L bluegill sunfish. It is nontoxic to bees, with an oral and contact LD₅₀ (90 hour) of 6.6 µg/bee (Tomlin, 1994).

Methyl Bromide

Table 2 describes some of the physical-chemical properties of methyl bromide.

Table 2 Some Physical-Chemical Properties of methyl bromide.

Chemical name	Bromomethane
Common name	Methyl bromide
Some tradenames	Metabrom, Terr-O-Gas 75
CAS number	74-83-9
Molecular formula	CH ₃ Br
Molecular weight	94.9
Form	Non-flammable, colorless, odorless gas at room temperature (Tomlin, 1997).
Solubility	Water: 17.5 g/L at 20°C (Tomlin, 1997)
Vapor pressure	190 kPa at 20°C (Tomlin, 1997).
Henry's Law Constant (KH)	1.61 x 10 ³ atm-m ³ /mole at 25°C (USDA, 1995).
Soil adsorption Coefficient (Kd)	3.45- 9.4 g/cm ³ (Kollman and Segawa, 1995).
Aerobic soil metabolism half-life	.15- 17 days (Kollman and Segawa, 1995).
Anaerobic soil metabolism half-life	1.63- 6.0 days (Kollman and Segawa, 1995).

Methyl bromide (figure 2) readily evaporates at temperatures normally encountered during fumigation, but some of the chemical may become entrapped in soil microspores following application (EXTOXNET, 1996). Transformation of methyl bromide to bromide increases as the amount of organic matter in the soil increases. Methyl bromide hydrolyzes in water forming methane and hydrobromic acid with an estimated hydrolysis half-life of 20 days at water temperature of 25°C and pH 7 (Montgomery, 1997).

Figure 2. The chemical structure of methyl bromide.



methyl bromide

Methyl bromide is moderately toxic to fish with an LC_{50} (96 hour) of 3.9 mg/L. It is nontoxic to bees when used as recommended.

B. CHEMICAL USES

1,3-Dichloropropene

As of May 2000, eleven products containing 1,3-dichloropropene were registered for use in California. 1,3-Dichloropropene is a multi-purpose liquid fumigant used to control nematodes, wireworms, and certain soil borne diseases in cropland. It is used for pre-planting control of most species of nematode in deciduous fruit and nuts, citrus fruit, berry fruit, vines, strawberries, hops, field crops, vegetables, tobacco, beet, pineapples, peanuts, ornamental and flower crops, tree nurseries, etc. It also has secondary insecticidal and fungicidal activity (Tomlin, 1994).

In California's agricultural setting, growers primarily use 1,3-dichloropropene on carrots, sweet potatoes, wine grapes, and for preplant soil preparation. 1,3-Dichloropropene recommended label use rates range from 9 to 55 gallons per acre depending on soil type or texture for a broadcast application and 26 to 162 fluid ounces per 1000 feet of row per outlet depending on soil type or texture.

The 1,3-dichloropropene product label offers methods for application, including: broadcast (using chisel, offset swing shank, Nobel plow or plow-sole application equipment) and row application. Immediately after application, the soil must be "sealed" to prevent fumigant loss and to ensure that an effective concentration of fumigant is maintained within the soil for a period of several days. 1,3-Dichloropropene is available as a liquid fumigant, is a restricted use pesticide due to its high acute inhalation toxicity and carcinogenicity, and includes the Signal Word "Warning" on the label.

Methyl bromide

As of May 2000, fifty-four products containing methyl bromide were registered for use in California. Methyl bromide is a multi purpose fumigant used for insecticidal, acaricidal, and rodenticidal control in mills, warehouses, grain elevators, ships, etc., stored products, soil fumigations, greenhouses, and mushroom houses. In field fumigations it is used to treat a wide range of insects, nematodes, soil-borne diseases, and seed weeds.

In California's agricultural setting, growers primarily use methyl bromide on strawberries, almonds, and sweet potatoes. Methyl bromide recommended label use rates range from 1 to 20 pounds per 1000 cubic feet for non-food products, 0.2-9 pounds per 1000 cubic feet for structures associated with raw or processed commodities, 1 to 2 pounds per 1000 cubic feet for processed foods, and 1.5 to 9 pounds per 1000 cubic feet for raw agricultural commodities. The methyl bromide product label recommends use rates of 1.5 to 3 pounds active ingredient per 100 cubic feet for almonds and strawberries and 2 to 4 pounds 100 cubic feet for sweet potatoes (where fumigations below 70°F may result in damage). The label for methyl bromide also lists tolerances (ppm) and exposure times for raw agricultural commodities and processed foods. For structures and non-food products exposure times are listed. For field pre-plant applications of methyl bromide, the label suggests using 240-320 pounds per acre and waiting two weeks after the exposure period before introducing transplants or vegetative plant parts and waiting 96 hours before planting crop seeds. Methyl bromide is odorless, except at high concentrations, and is generally used with a warning agent such as chloropicrin.

The methyl bromide product label offers several methods for application, including: chamber and vault fumigation, vacuum chamber fumigation, tarpaulin fumigation, warehouse, grain elevator, food processing plant, restaurant and other structures containing commodities, and shipboard fumigations. Methyl bromide is available as a gas fumigant, is a restricted use pesticide due to its acute toxicity, and includes the Signal Word "Danger" on the label.

With DPR's implementation of full pesticide use reporting in 1990, all users must report the agricultural use of any pesticide to their county agricultural commissioner, who subsequently forwards this information to DPR. DPR compiles and publishes the use information in the annual Pesticide Use Report (PUR). Because of California's broad definition for agricultural use, DPR includes data from pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and rights-of-way, postharvest applications of pesticides to agricultural commodities, and all pesticides used in poultry and fish production, and some livestock applications in the PUR. DPR does not collect use information for home and garden use, or for most industrial and institutional uses. The information included in this monitoring recommendation reflects widespread cropland applications of 1,3-dichloropropene and methyl bromide. Use rates were calculated by dividing the total pounds of each chemical used (where the chemical was applied to acreage) by the total number of acres treated.

According to the PUR, the total amount of 1,3-dichloropropene and methyl bromide used in California from 1996 to 1998 has ranged annually between slightly over 16,500,000 to over

17,500,000 pounds (Table 3). The majority of California's total use of these chemicals occurred in five counties—Monterey, Kern, Ventura, Merced, and Santa Cruz. On average the total use for the highest 15 counties in California made up 85% of the total use in California.

In California, growers use 1,3-dichloropropene primarily to control nematodes in carrots, sweet potatoes, preplant soil application and potatoes (Table 4). Table 6 displays the use of 1,3-dichloropropene by month in Monterey, Kern, Ventura, Merced, and Santa Cruz Counties. Methyl bromide is used primarily on strawberries, preplant soil applications, and outdoor container/ field grown plants (Table 5). Table 7 displays the use of methyl bromide by month in Monterey, Kern, Ventura, Merced, and Santa Cruz Counties. Use of these chemicals is difficult to predict as disease and nematode pressure is somewhat dependent on weather and other factors, such as cultural practices. However, assuming that no significant changes in weather occur, use is not expected to change.

Table 3. Annual Cropland Use of 1,3-Dichloropropene and Methyl Bromide by County (Pounds of Active Ingredient)

County	1996		1997		1998		Total
	1,3-dichloropropene	Methyl bromide	1,3-dichloropropene	Methyl bromide	1,3-dichloropropene	Methyl bromide	
MONTEREY	242,779	3,278,991	273,347	3,332,526	367,613	3,267,556	10,762,812
KERN	602,527	1,520,245	730,507	1,344,482	684,146	1,038,477	5,920,384
VENTURA	22,025	1,676,398	89,756	1,618,110	46,091	2,111,545	5,563,925
MERCED	144,223	1,381,889	85,805	1,255,093	288,513	999,915	4,155,438
SANTA CRUZ	62,129	1,053,817	50,155	1,100,498	67,448	1,109,563	3,443,610
FRESNO	270,836	853,518	228,256	1,049,669	192,733	707,337	3,302,349
SANTA BARBARA	5,458	905,182	19,651	983,246	58,379	1,025,058	2,996,974
JOAQUIN	34,259	879,029	196,877	695,664	118,995	587,093	2,511,917
STANISLAUS	44,061	807,070	156,282	705,315	206,514	551,292	2,470,534
TULARE	79,782	716,703	90,718	947,699	198,622	374,598	2,408,122
RIVERSIDE	0	753,075	723	598,894	20,265	664,934	2,037,891
ORANGE	248	624,879	1,267	576,888	0	581,282	1,784,564
SAN DIEGO	5	587,681	23	554,463	3,415	439,391	1,584,978
IMPERIAL	259,682	165,954	265,340	189,949	364,962	233,510	1,479,397
LOS ANGELES	17	515,803	0	444,072	646	363,481	1,324,019
Total for Top 15 Counties	1,768,031	15,720,234	2,188,707	15,396,568	2,618,342	14,055,032	51,746,914
Percent of CA Total	91	84	89	84	88	86	85
Total Statewide Use	1,950,684	18,727,175	2,457,881	18,294,606	2,980,930	16,362,548	60,773,824

Table 4. Annual Cropland Use of 1,3- Dichloropropene by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	Total
CARROTS, GENERAL	730,564	929,297	923,379	2,583,240
SWEET POTATO	73,194	75,080	279,827	428,101
SOIL APPLICATION, PREPLANT- OUTDOOR (SEEDBED)	296,937	144,061	273,525	714,523
POTATO (WHITE, IRISH, RED, RUSSET)	93,724	264,134	169,057	526,915
GRAPES, WINE	24,036	99,350	150,468	273,854
CANTALOUPE	35,918	15,759	129,331	181,008
ALMOND	108,408	56,052	109,414	273,874
BRUSSELS SPROUTS	70,784	72,516	94,870	238,170
TOMATOES, FOR PROCESSING/CANNING	14,175	42,176	88,090	144,441
WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	15,257	26,291	62,276	103,824
OUTDOOR GROWN CUT FLOWERS OR GREENS	199	414	61,125	61,738
BROCCOLI	24,646	56,417	60,923	141,986
Total	1,489,838	1,783,544	2,404,283	5,677,665

Table 5. Annual Cropland Use of Methyl Bromide by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	Total
STRAWBERRY (ALL OR UNSPEC)	4,374,955	4,041,796	4,251,831	12,668,582
SOIL APPLICATION, PREPLANT- OUTDOOR (SEEDBED)	1,403,438	2,148,825	1,522,671	5,074,934
OUTDOOR CONTAINER/FIELD GROWN PLANTS	1,122,379	922,653	1,064,688	3,109,720
OUTDOOR GROWN TRANSPLANT	515,562	509,527	547,145	1,572,234
SWEET POTATO	611,586	766,042	541,923	1,919,551
ALMOND	613,743	881,792	502,949	1,998,484
GRAPES, WINE	1,480,701	897,380	478,272	2,856,353
OUTDOOR GROWN CUT FLOWERS OR GREENS	426,511	545,718	444,971	1,417,200
PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	344,828	295,151	403,080	1,043,059
TOMATO	336,194	263,210	304,411	903,815
PEACH	248,082	287,120	280,028	815,230
GRAPES	299,627	569,054	273,836	1,142,517
Total	11,779,602	12,130,265	10,617,803	34,521,670

Table 6. Monthly Use of 1,3-Dichloropropene for 1996-1998 in Monterey, Kern, Ventura, Merced, and Santa Cruz Counties (Pounds of Active Ingredient)

Month	Monterey	Kern	Ventura	Merced	Santa Cruz	Total
January	1,911	33,168	1,591	1,816	0	38,486
February	38,750	240,842	9,902	11,207	1,082	301,783
March	62,785	107,009	40,623	149,818	4,720	364,955
April	77,376	36,105	27,974	86,803	22,980	251,238
May	169,759	24,765	24,259	61,943	99,926	380,652
June	111,724	90,681	2,006	0	26,641	231,052
July	30,717	589,512	1,636	0	2,656	624,521
August	20,041	271,511	35,660	185	5,829	333,226
September	38,431	17,248	2,015	0	7,049	64,743
October	79,253	189,594	1,106	19,847	3,590	293,390
November	187,546	274,863	11,094	123,190	4,753	601,446
December	65,447	141,882	6	63,733	507	271,575
Total	883,740	2,017,180	157,872	518,542	179,733	3,757,067



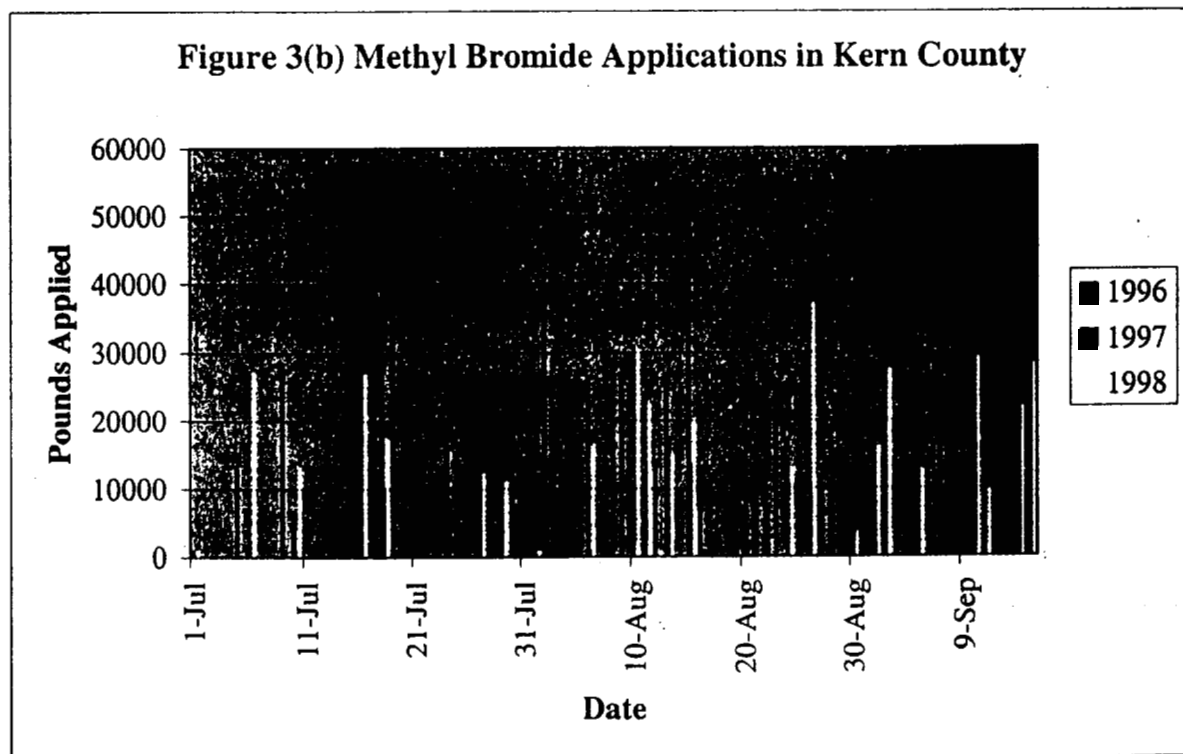
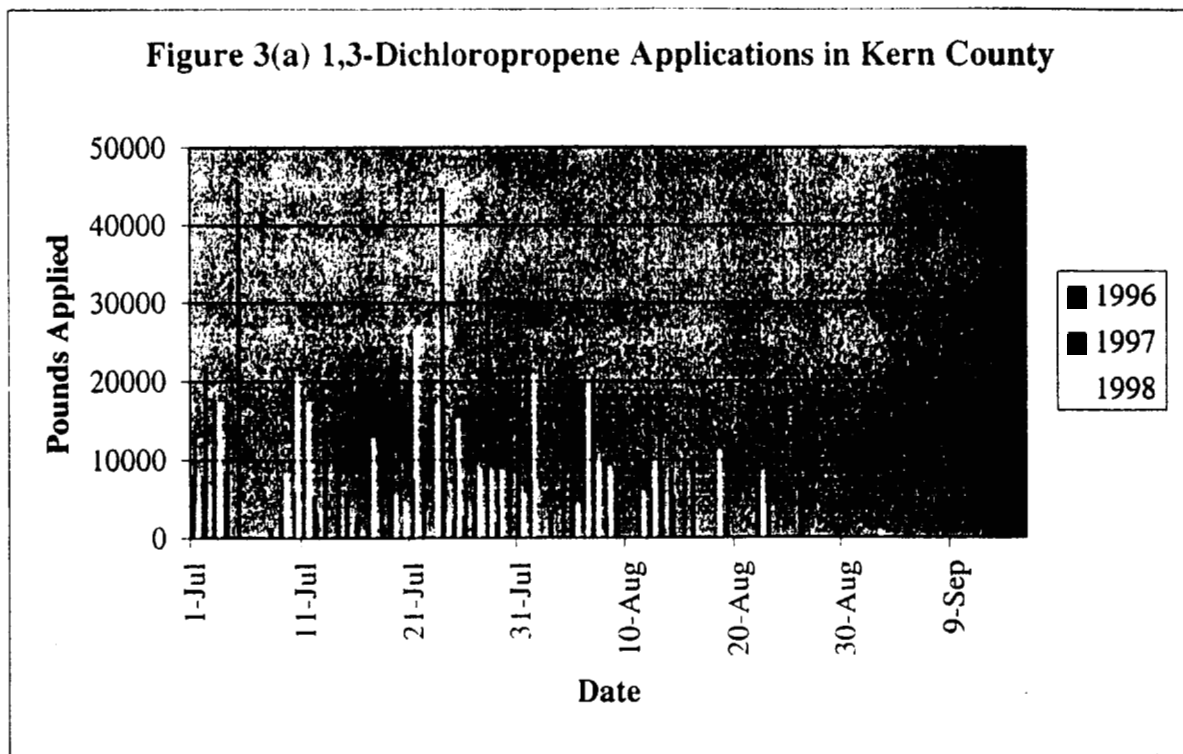
Table 7. Monthly Use of Methyl Bromide for 1996-1998 in Monterey, Kern, Ventura, Merced, and Santa Cruz Counties (Pounds of Active Ingredient)

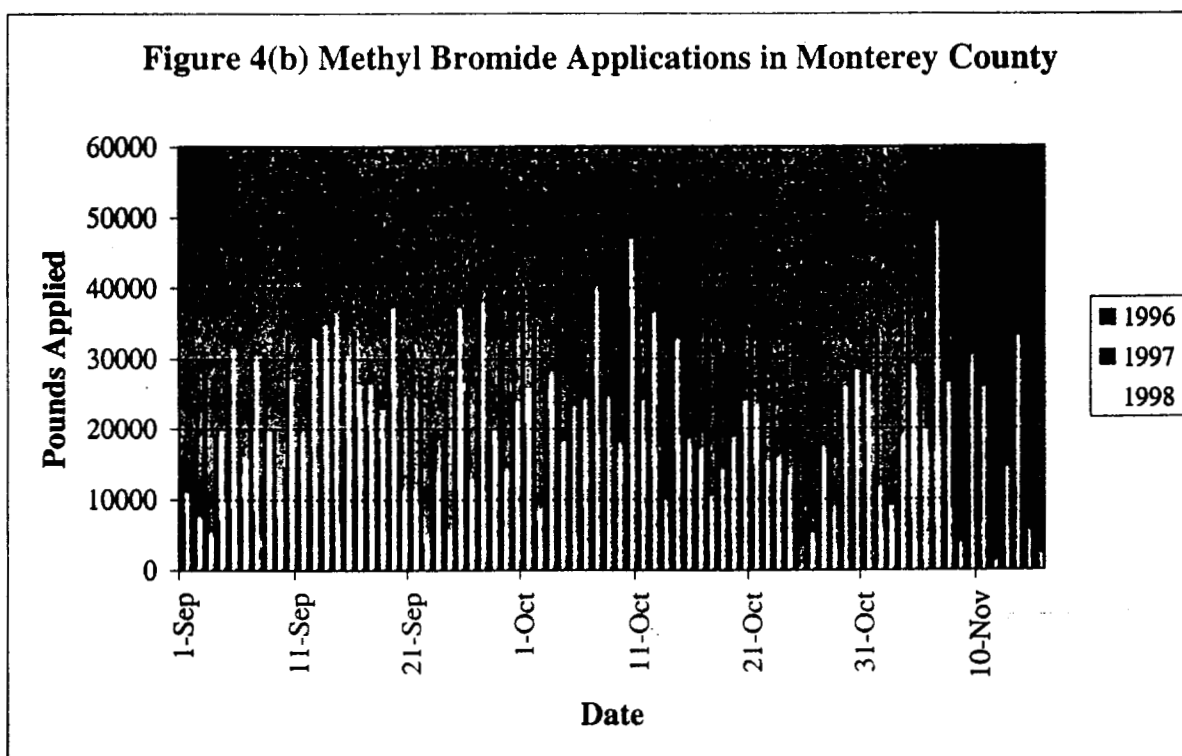
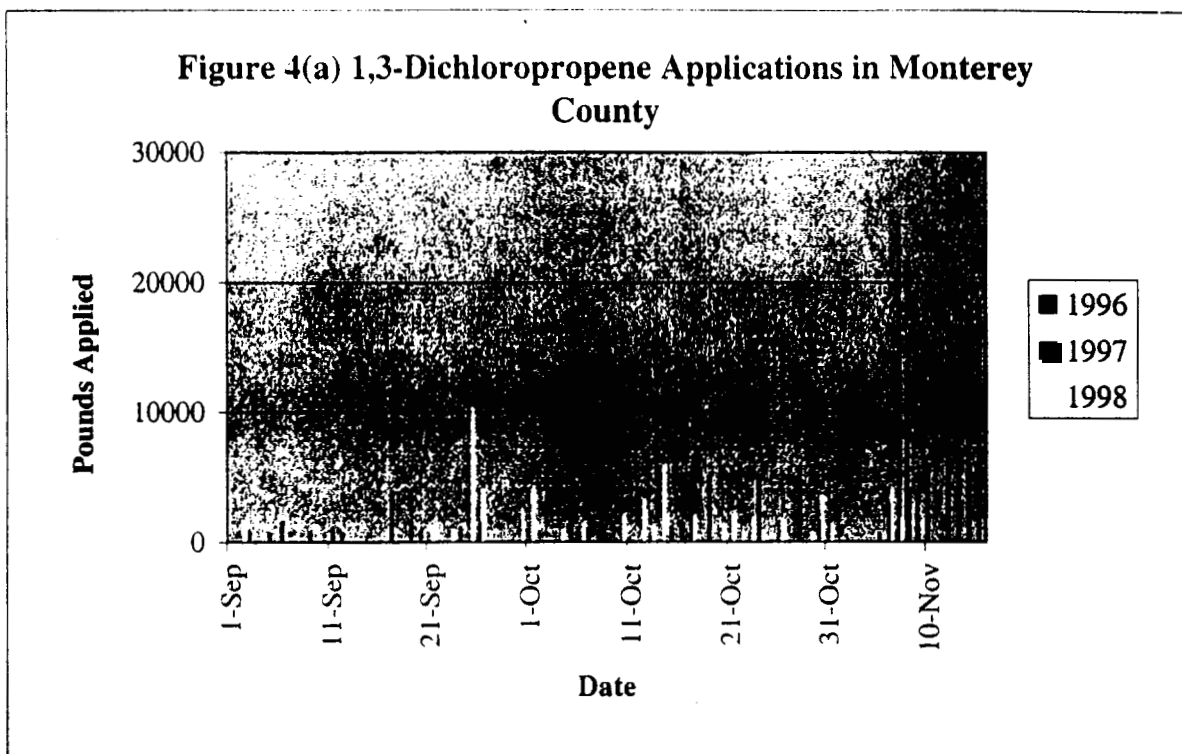
Month	Monterey	Kern	Ventura	Merced	Santa Cruz	Total
January	63,440	379,271	15,556	463,855	4,602	926,724
February	52,240	249,662	32,160	638,968	9,857	982,887
March	142,934	309,359	125,890	557,505	27,244	1,162,932
April	92,483	134,745	218,149	413,841	62,018	921,236
May	204,725	45,906	212,633	139,518	57,281	660,063
June	475,446	98,449	575,527	29,885	52,534	1,231,841
July	684,920	370,021	694,969	69,678	133,677	1,953,265
August	1,473,668	629,830	1,975,388	91,752	476,961	4,647,599
September	2,729,203	566,764	1,357,077	127,428	1,190,349	5,970,821
October	2,894,964	237,378	118,854	155,292	1,067,609	4,474,097
November	1,037,011	501,930	58,124	277,586	176,728	2,051,379
December	28,014	379,888	21,725	671,588	5,020	1,106,235
Total	9,879,048	3,903,203	5,406,052	3,636,896	3,263,880	26,089,079

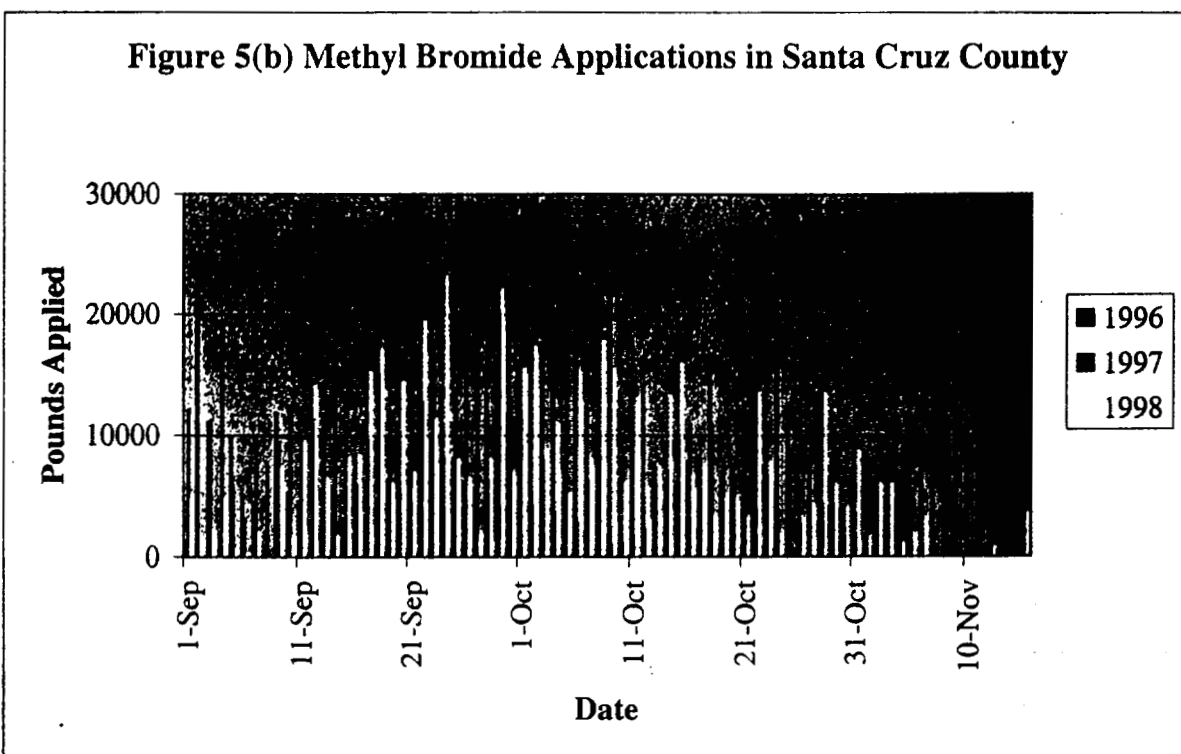
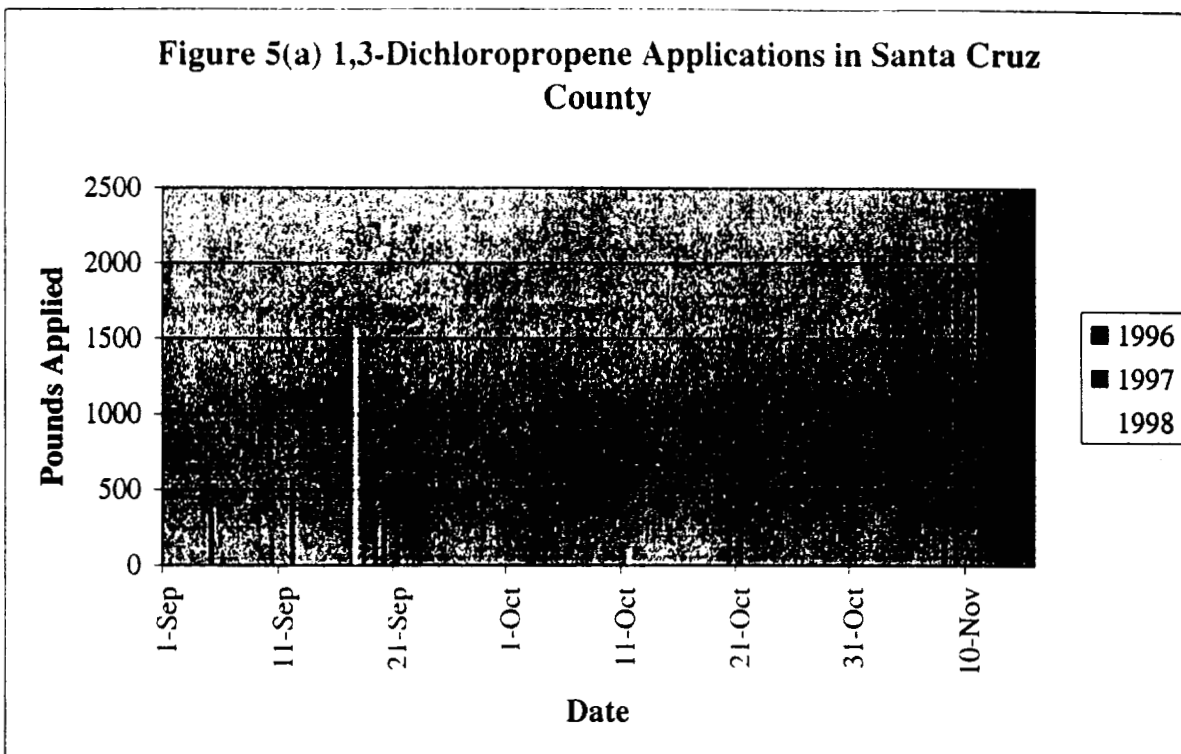
RECOMMENDATIONS

1. Ambient Air Monitoring

The historical trends in 1,3-dichloropropene and methyl bromide use suggest that monitoring should occur over a two-month period during July and August in Kern County and September and October in Monterey or Santa Cruz County. Figures 5(a-b) display 1,3-dichloropropene and methyl bromide use in Kern County during the period from July 1 through September 15 for 1996, 1997, and 1998. Figures 6(a-b) and Figures 7(a-b) display 1,3-dichloropropene and methyl bromide use respectively in Monterey and Santa Cruz Counties during the period from September 1 through November 15 for 1996, 1997, and 1998. Attachments A and B display methyl bromide and 1,3-dichloropropene use by section in the Central Coast during 1997 and 1998. Attachments C and D display methyl bromide and 1,3-dichloropropene use by section in the Central Valley during 1997 and 1998. Six sampling sites should be selected in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations, or other public buildings). Monitoring for both chemicals should be simultaneous. Samples should be collected and analyzed for 1,3-dichloropropene and methyl bromide. At each site, 4 samples per week should be collected during the sampling period. Background samples should be collected in an area as distant as practical to applications of 1,3-dichloropropene and methyl bromide. Four replicate (collocated) samples are needed for each week of monitoring. The replicate samples may be collected at a single site over four days, or multiple sites for fewer days each week. Target 24-hour quantitation limits of at least $0.01 \mu\text{g}/\text{m}^3$ for 1,3-dichloropropene and $0.4 \mu\text{g}/\text{m}^3$ for methyl bromide are recommended.







DPR recommends close coordination with the county agricultural commissioner to select the best sampling sites and periods. Field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling. Additionally, we request that you provide in the ambient monitoring report: 1) the proximity of the sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground.

2. Application-Site Air Monitoring

DPR has several studies that included application-site monitoring. No application-site monitoring is required for these chemicals.

D. SAFETY RECOMMENDATIONS

1,3-Dichloropropene

The 1,3-dichloropropene product label warns that 1,3-dichloropropene may cause substantial, but temporary eyes injury if the product gets into the eyes. The product may cause skin irritation, skin burns, allergic skin reaction and be fatal if absorbed through the skin. The vapor may be fatal if inhaled and may cause lung, liver, and kidney damage and respiratory system irritation upon prolonged contact.

Monitoring personnel should use proper protective equipment to prevent exposure to the dust, vapors or spray mist. According to the product labels, proper protective equipment for applicators making direct contact or for applicators outside an enclosed cab includes coveralls, chemical-resistant gloves and footwear plus socks, face sealing goggles, chemical resistant headgear (for overhead exposure) and apron, and a respirator with an organic-vapor removing cartridge. Monitoring personnel should refer to the label of the actual product used for further precautions.

Methyl bromide

According to the product label for methyl bromide, it is an extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung or nervous system injury. Liquid or vapor may cause skin or eye injury. Methyl bromide vapor is odorless and non-irritating to skin and eyes during exposure and toxic levels may occur without warning or detection.

The acceptable air concentration for persons exposed to methyl bromide is 5 ppm, except for those in residential or commercial structures. A respirator is required if air concentrations exceed 5 ppm at any time. According to the label, proper protective equipment for applicators include loose fitting or well ventilated long-sleeved shirt and long pants, shoes and socks, full-face shield

or safety glasses with brow and temple shields. Monitoring personnel should refer to the label of the actual product used for further precautions.

E. ANALYTICAL METHODS

There are several analytical methods for both 1,3-dichloropropene and methyl bromide. DPR is familiar with three of these methods: sorbent tube/solvent extraction, sorbent tube/headspace analysis, and canisters. There is some question regarding the performance of these methods, particularly for methyl bromide (Biermann and Barry, 1999). Assuming that the desired detection limits can be achieved, DPR prefers methods using canisters. The canisters offer several advantages over sorbent tubes. For example, canisters do not have any breakthrough problems. Quality control tests involve air spikes and more closely resemble actual conditions than the liquid spikes used for sorbent tubes. Methyl bromide and 1,3-dichloropropene can also be determined simultaneously with canisters. This is unlikely for sorbent tubes. In the long-term, DPR would like ARB to develop a method that will also sample for these two chemicals in addition to methyl isothiocyanate, methyl isocyanate, and chloropicrin simultaneously. This is also unlikely for sorbent tubes.

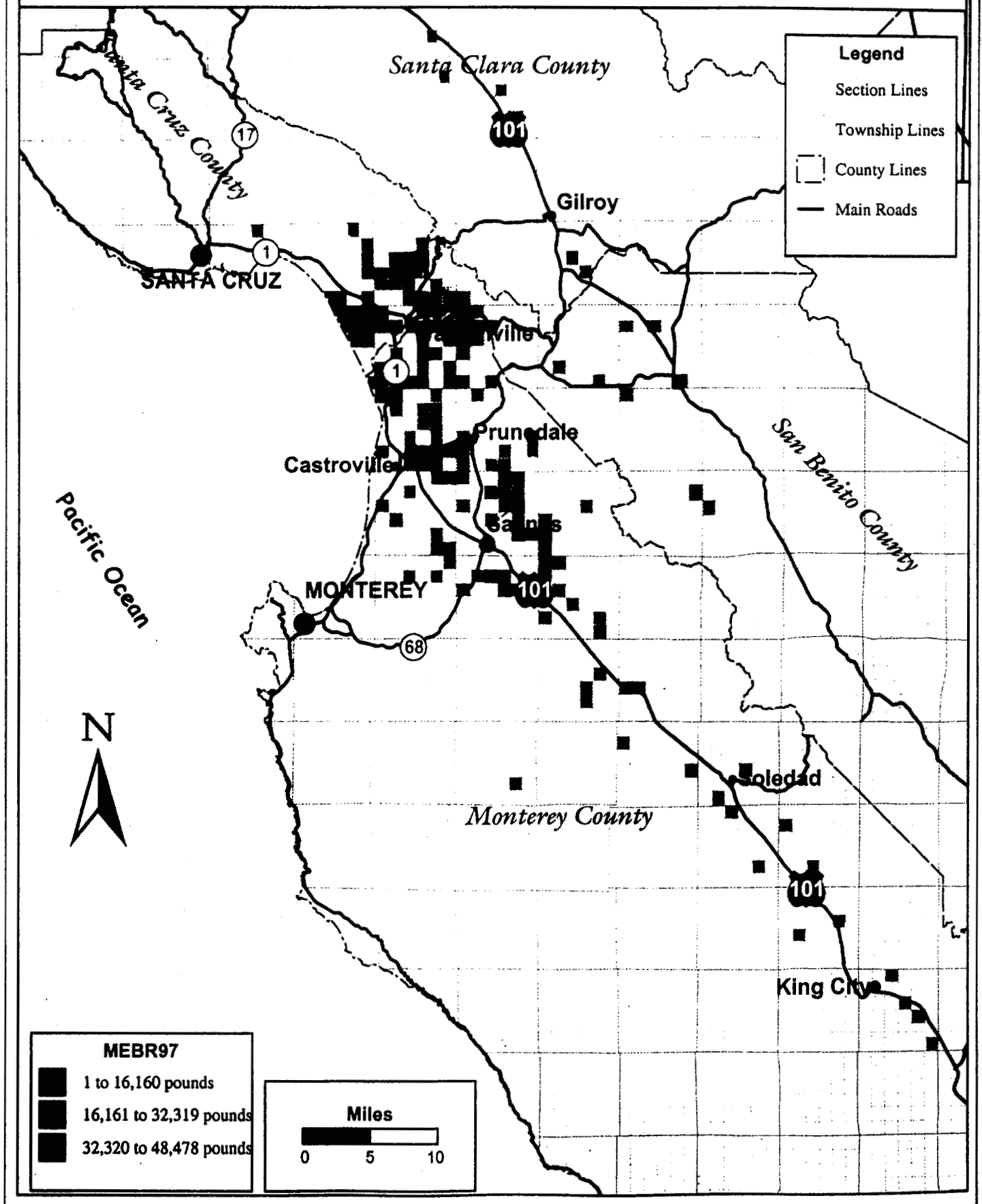
DPR would also like to take this opportunity to compare the different sampling and analytical methods. If ARB can collect these samples, DPR will oversee this part of the monitoring and arrange for cooperators to conduct analyses that ARB cannot conduct. DPR estimates that this will add 10 to 20 samples for each of the other methods. The scheduling and location of this comparison is flexible.

F. REFERENCES

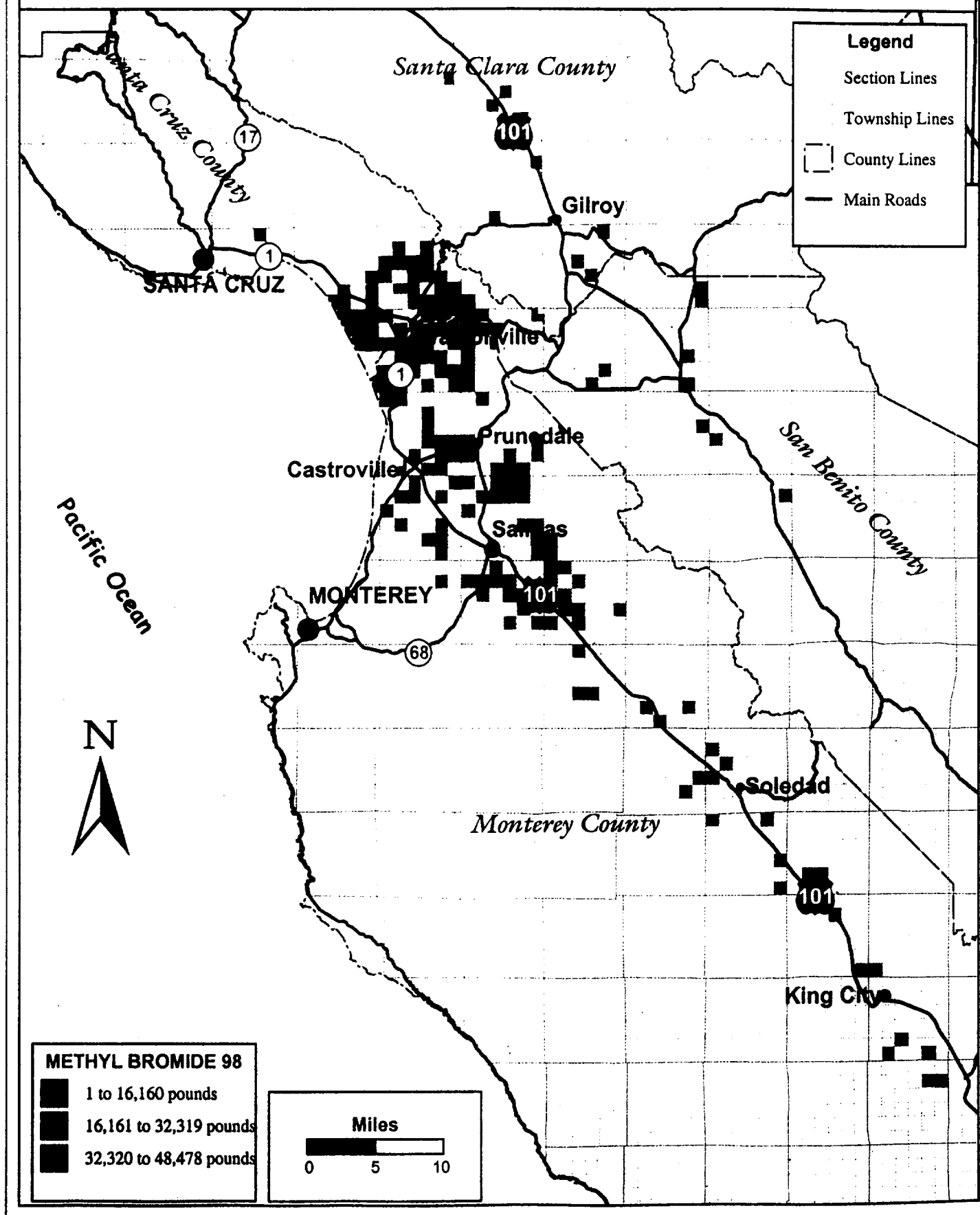
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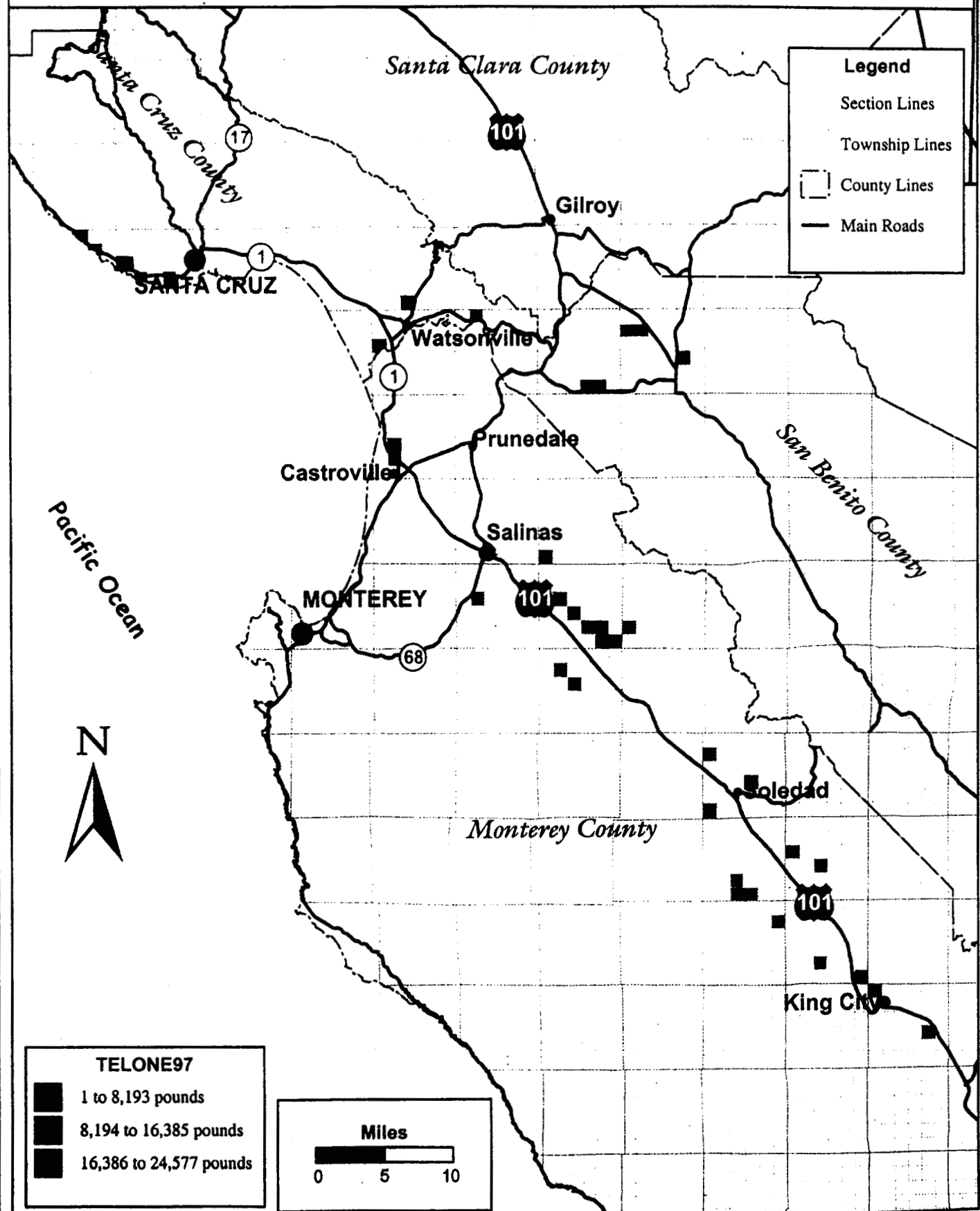
**Attachment A (1): 1997 Methyl Bromide Use in Central Coast
(September 1 - November 15, 1997)**



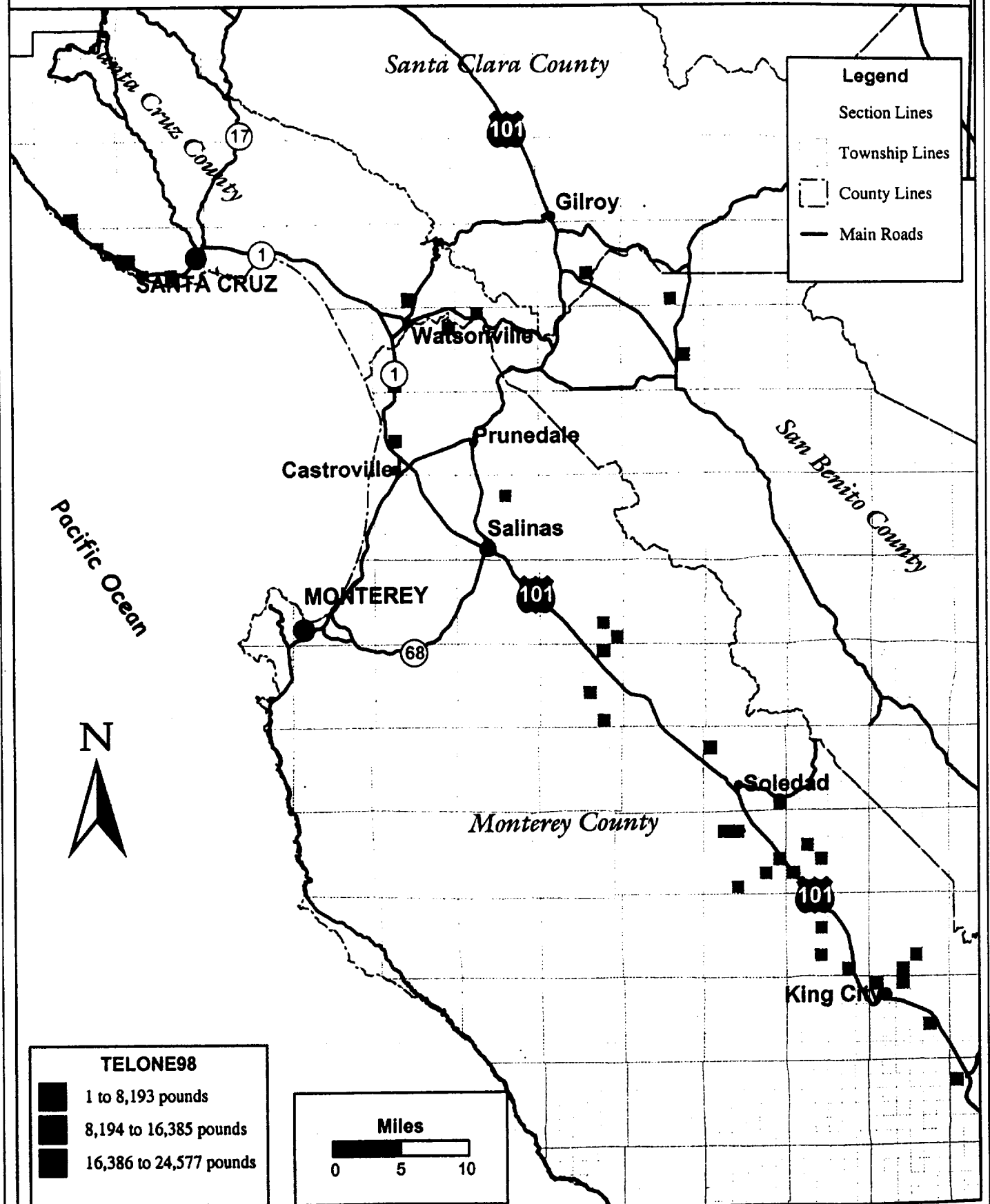
**Attachment A (2): 1998 Methyl Bromide Use in Central Coast
(September 1 - November 15, 1998)**



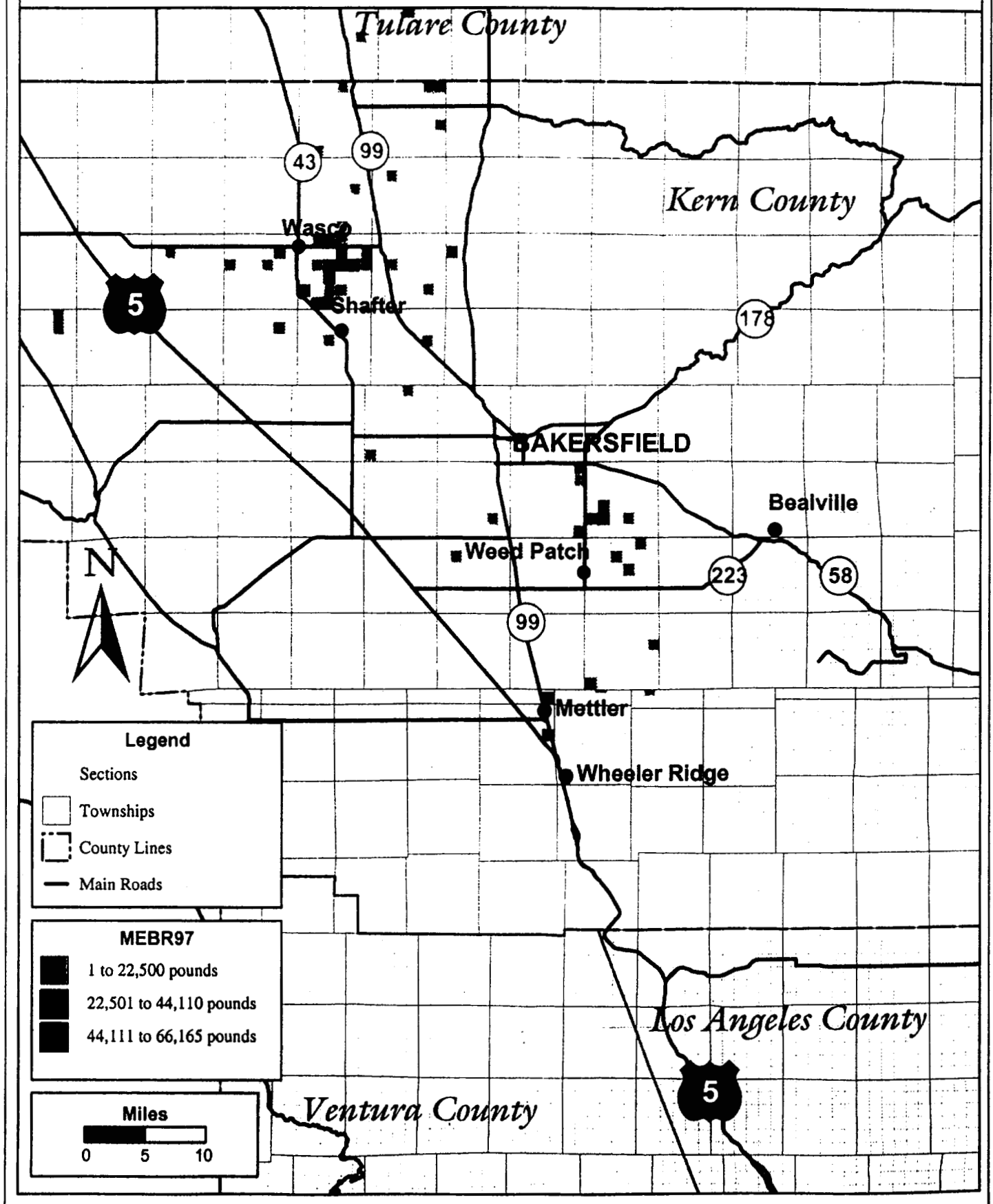
**Attachment B (1): 1997 1,3-Dichloropropene Use in Central Coast
(September 1 - November 15, 1997)**



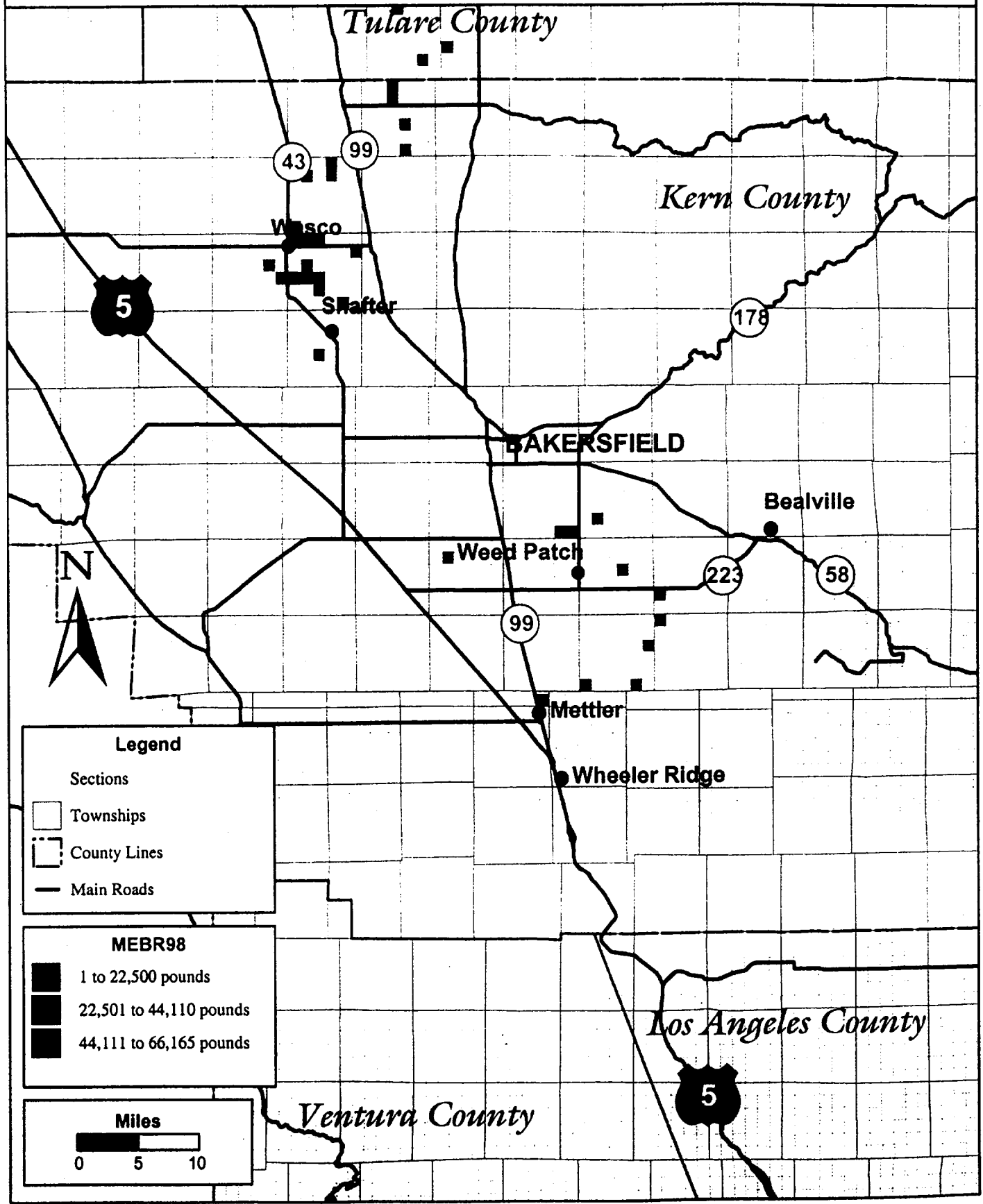
**Attachment B (2): 1998 1,3-Dichloropropene Use in Central Coast
(September 1 - November 15, 1998)**



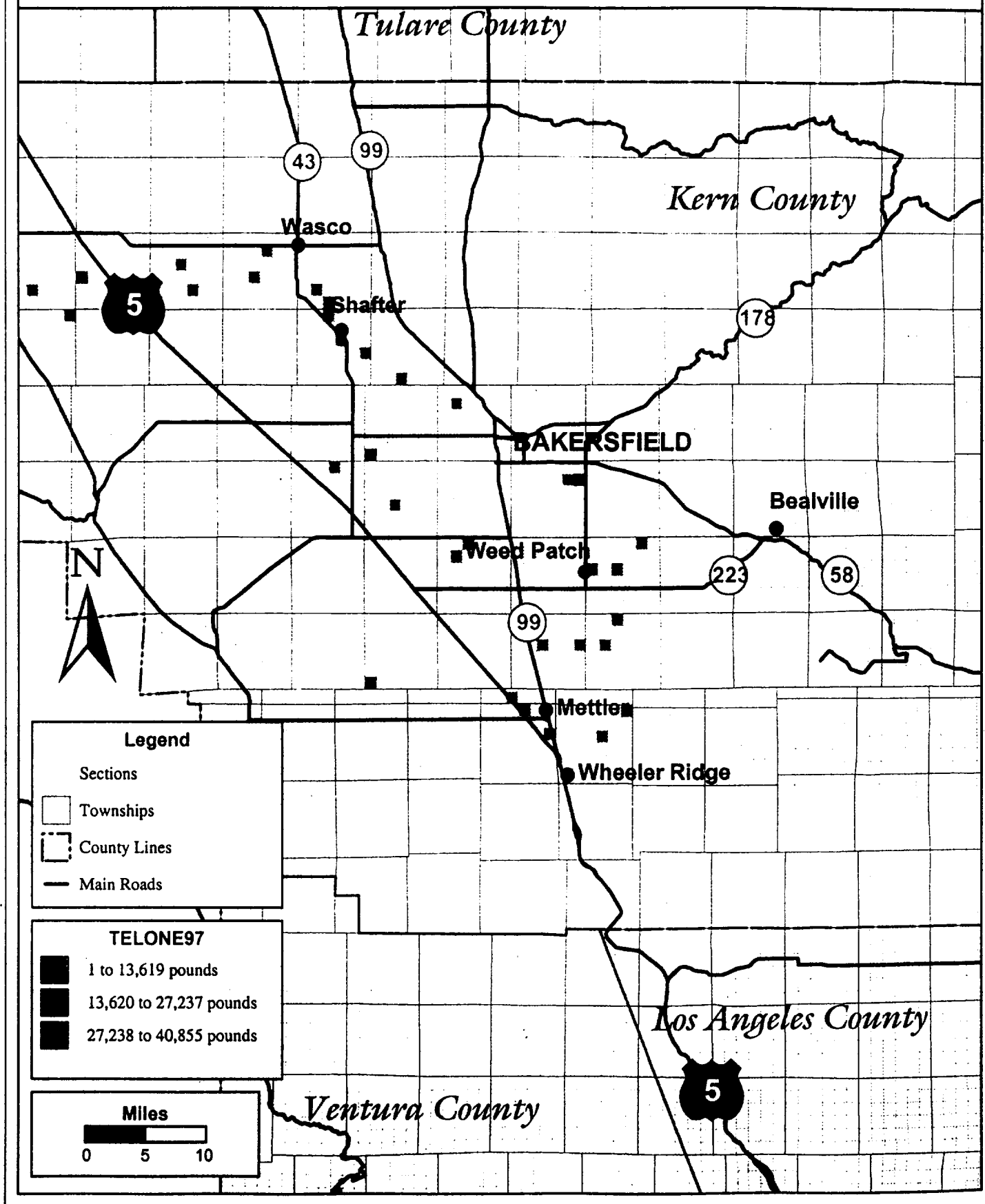
Attachment C (1): 1997 Methyl Bromide Use in Central Valley
(July 1-September 15, 1997)



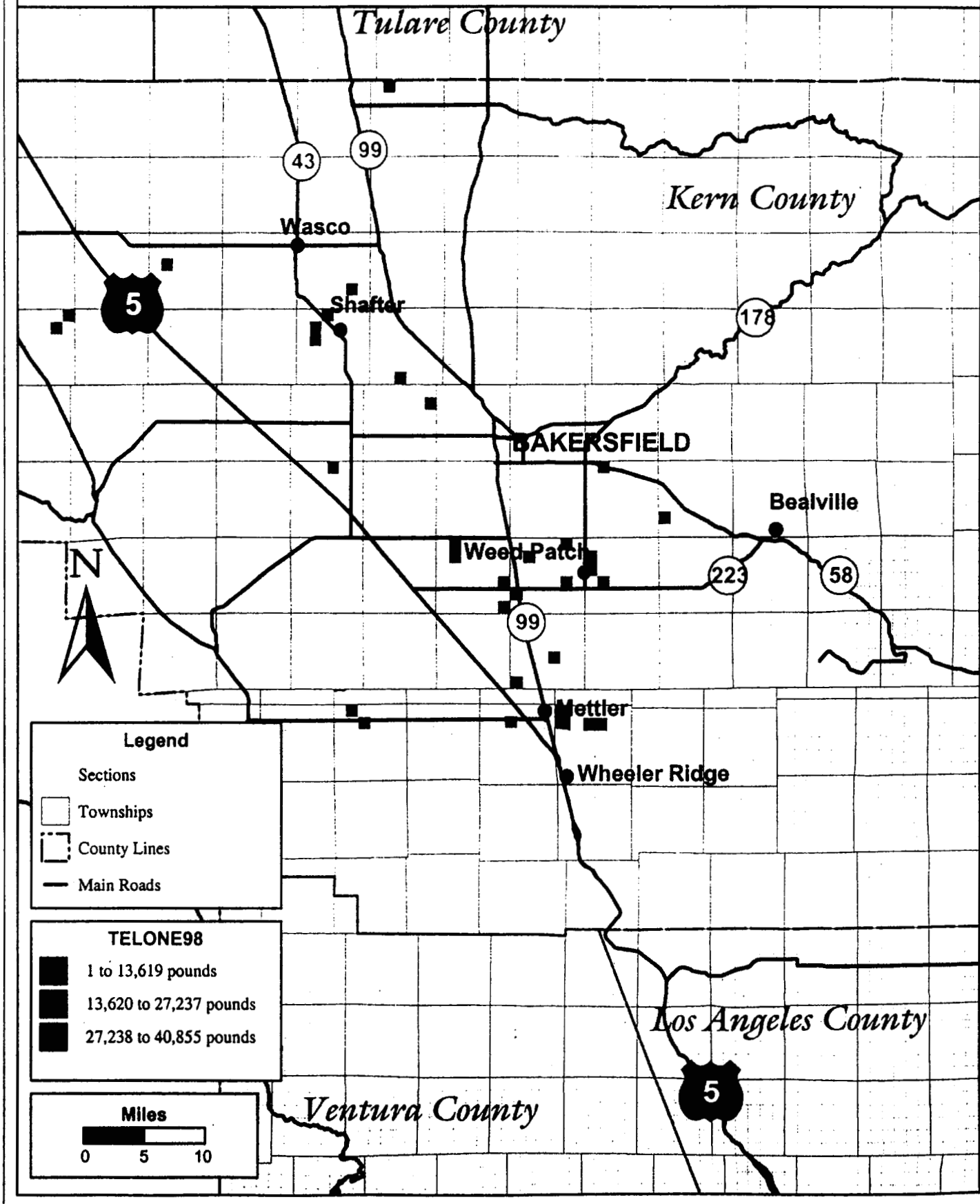
Attachment C (2): 1998 Methyl Bromide Use in Central Valley
(July 1-September 15, 1998)



**Attachment D (1): 1997 1,3-Dichloropropene Use in Central Valley
(July 1-September 15, 1997)**



**Attachment D (2): 1998 1,3-Dichloropropene Use in Central Valley
(July 1-September 15, 1998)**



APPENDIX VI
CANISTER AMBIENT FIELD LOG SHEETS

SAMPLE FIF LOG SHEET
Calivers
 Project 00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
1	SAL-FS	9/11/00	0805	3.00	-28.5	9/12/00	0754	2.89	-10.0	15	DPR-1069	Foggy, Field Spike	JRR
2	SAL-1	9/11/00	0808	3.00	-29.0	9/12/00	0757	2.96	-8.0	4	DPR 1150	Foggy Field Spike	JRR
3	OAS-1	9/11/00	0941	3.00	-29.5	9/12/00	0917	3.1	-8.5	5	DPR 1165	K	JRR
4	CHU-1	9/11/00	1035	3.00	-29.0	9/12/00	0958	3.00	-5.5	10	DPR 1083	K	JRR
5	LJE-1	9/11/00	1130	3.00	-30.0	9/12/00	1035	Φ	-15.0	1	DPR 1072	K DO (normal)	JRR
6	PMS-1	9/11/00	1215	3.00	-30	9/12/00	1120	2.75	-10	12	1075	K/C	JRR
7	SES-1	9/11/00	1255	3.00	-30.0	9/12/00	1155	2.22	-14.1	3	1183	K/C	JRR
8	SAL-2	9/12/00	0814	3.00	-29	9/13/00	0815	2.98	-10.0	4	DPR 1169	K	JRR
9	OAS-2	9/13/00	0920	3.0	-30	9/13/00	0920	2.98	-5.7	2	DPR 1137	C/C	JRR
10	OAS-2D	9/12/00	0920	3.0	-29.5	9/13/00	0920	2.88	-5.0	5	DPR 1110	C/C	JRR
11	CHU-2	9/12/00	1000	3.0	-30	9/13/00	1020	2.52	-9.0	13	DPR 1167		JRR
12	LJE-2	9/12/00	1035	3.0	-30	9/13/00	1105	2.88	-8.5	6	DPR 1100	PC/PC	JRR
13	PMS-2	9/12/00	1120	3.0	-30	9/13/00	1155	3.0	-11.5	11	DPR 1093	C/PC	JRR
14	SES-2	9/12/00	1200	3.0	-30	9/13/00	1230	2.30	-9.8	3	DPR 1101	K/PC	JRR
15	Trip Spike	9/11/00	—	—	—	9/12/00	—	—	—	—	—	Trip Spike	JRR
16	Field Blank	9/11/00	—	—	—	9/12/00	—	—	—	—	—	Field Blank	JRR
17	SAL 3	9-13-00	0820	3.0	-30	9/14/00	0815	3.31	-6.0	4	DPR 1099	PC/C	JRR
18	SAL 3D	9-13-00	0820	3.0	-30	9/14/00	0820	3.21	-8.0	15	DPR 1152	PC/C	JRR

SAMPLE FIF LOG SHEET
 Ca. ters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
✓ 19	OAS-3	9-13-00	0930	3.0	-30	9-14-00	0935	3.10	-8.4	2	1143	PC/c	② JH
✓ 20	CHU-3	9-13-00	1025	2.0	-30	9-14-00	1035	2.41	-6.7	13	1160	PC/c	② JH
✓ 21	CHU-3D	9-13-00	1025	3.0	-30	9-14-00	1035	3.03	-6.1	10	1065	PC/c	② JH
✓ 22	LJE-3	9/13/00	1115	3.0	-30	9-14-00	1200	3.10	-7.5	6	1124	PC/c	② JH
✓ 23	LJE-3D	9/13/00	1120	3.0	-30	9-14-00	1205	3.08	-6.0	5	1113	PC/c	② JH
✓ 24	PMS-3	9/13/00	1200	3.0	-30	9-14-00	1235	3.10	-7.0	11	1138	PC/c	② JH
✓ 25	PMS-3D	9/13/00	1208	3.0	-30	9-14-00	1235	2.91	-7.5	12	1141	PC/c	② JH
26	SES-3	9/13/00	1240	3.0	-30	9-14-00	1310	2.08	-4.2	3	1092	PC/c	② JH
27	SAL-4	9/14/00	0830	3.0	-29.5	9/15/00	0805	2.96	-8.5	4	1070	C/O	② JH
28	OAS-4	9/14/00	0850	3.0	-30	9/15/00	0900	3.00	-10	2	1105	C/O	② JH
29	CHU-4	9/14/00	0940	3.00	-29.8	9/15/00	0950	2.96	-7.5	13	1164	C/O	② JH
30	LJE-4	9/14/00	1200	3.00	-30.0	9/15/00	1105	2.98	-9.0	6	1053	C/K	② JH
31	PMS-4	9/14/00	1245	3.00	-30	9/15/00	1145	2.94	-8.5	11	1103	C/K	② JH
32	SES4	9/14/00	1315	3.0	-30	9/15/00	1215	2.86	-10	3	1016	C/K	② JH
33	SES4D	9/14/00	1315	3.0	-30	9/15/00	1215	3.0	-8.0	10	1011	C/K	② JH
34													
	END		12 th										

SAMPLE FIF LOG SHEET
 Calters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge Vac	Date	Time	Flowrate	Gauge				
34	SAL-5	9/18/00	0820	3.93-3.00	-30"	9/19/00	0800	3.25	-7	4	1098	K/K	GR/KS
35	OAS-5	9/18/00	0925	3.00	-30"	9/19/00	0910	3.00	-8	2	1063	K/	GR/KS
36	CHU-5	9/18/00	1015	3.00	-30"	9/19/00	1010	2.72	-5	13	1172	K/	KS/JR
37	LJE-5	9/18/00	1100	3.00	-27.6"	9/19/00	1112	2.73	-5	5	1051	K/	KS/JR
38	PMS-5	9/18/00	1145	3.0	-30	9/19/00	1155	3.0	-7	11	1054	K/	GR/KS
39	SES-5	9/18/00	1210	3.0-3.00	-30	9/19/00	1230	2.08	-14	3	1078	K/K	KS/JR
40	SAL-6	9/19/00	0810	3.1-3.0	-30	9/20/00	0810	3.17	-7	4	1133	K/	GR/KS
41	OAS-6	9/19/00	0915	3.00	-30	9/20/00	0910	3.00	-8	2	1186	K/K	KS
42	CHU-6	9/19/00	1015	2.5-3.0	-30	9/20/00	1010	3.20	-7	13	1080	K/	KS
43	LJE-6	9/19/00	1115	2.94-3.0	-30	9/20/00	1125	3.04	-6	5	1170	K/K	KS
44	PMS-6	9/19/00	1200	3.0	-30	9/20/00	1210	3.04	-6	11	1178	K/C	KS
45	SES-6	9/19/00	1235	2.8-3.0	-29	9/20/00	1250	3.04	-6	14	1112	K/K	KS
46	SAL-7	9/20/00	0812	3.00	-30	9/21/00	0800	3.15	-7	4	1127	K/C	KS
47	SAL-7	9/20/00	0911	3.00	-30	9/21/00	0802	3.00	-7	15	1177	K/K	KS
48	OAS-7	9/20/00	0912	3.00	-30	9/21/00	0900	2.95	-5	1	1106	K/K	KS
49	OAS-7D	9/20/00	0915	3.00	-30	9/21/00	0911	3.05	-8	2	1185	K/K	KS
50	CHU-7	9/20/00	1015	3.00	-30	9/21/00	0955	3.04	-10	9	1111	K/C	KS

SAMPLE FIF 7 LOG SHEET
Ca llers
Project C-00-028
Ambient Monitoring for Mebr and Telone
Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
51	CHU-7D	9/20/00	1017	3.3 - 2.05	-30.0	9/21/00	1000	3.00	-7	13	1159	K/C	KS
52	LJE-7	9/20/00	1130	3.07	-30.0	9/21/00	1125	3.00	-6	5	1131	K/C	KS
53	LJE-7D	9/20/00	1133	3.05	-30.0	9/21/00	1130	3.00	-8	6	1133	K/C	KS
54	PMS-7	9/20/00	1220	3.07	-30.0	9/21/00	1210	3.00	-7	11	1146	C/C	KS
55	PMS-7D	9/20/00	1225	3.06	-30.0	9/21/00	1212	2.85	-11	12	1147	C/C	KS
56	SES-7	9/20/00	1255	3.04	-30.0	9/21/00	1250	3.06	-2.9	10	1150	K/C	KS
57	SES-7D	9/20/00	1300	3.28 3.08	-30.0	9/21/00	1253	3.00	-5.5	14	1156	K/C	KS
58	SAL-8	9/21/00	0803	3.06	-30.0	9/22/00	0800	3.30	-7	4	1017	C/C	KS
59	OAS-8	9/21/00	0905	3.00	-30.0	9/22/00	0905	3.00	-5.5	1	1156	K/C	KS
60	CHU-8	9/21/00	1002	3.02	-30.0	9/22/00	1000	3.00	-6	9	1150	C/C	KS
61	LJE-8	9/21/00	1130	3.00	-30.0	9/22/00	1122	3.00	-6.5	15	1151	C/C	KS
62	PMS-8	9/21/00	1215	3.00	-30.0	9/22/00	1205	3.00	-7	11	1157	C/C	KS
63	SES-8	9/21/00	1255	3.04	-30.0	9/22/00	1250	3.28	-6	10	1158	C/C R	KS

END OF 2ND WEEK

SAMPLE FIF LOG SHEET
 Counters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
64	SAL-9	9/25/00	0915	3.2-3.0	-29	9/24/00	0920	3.1	-8.0	4	1058	K/C	GR/
65	OAS-9	9/25/00	1100	3.0-3.2	-28.5	9/24/00	1045	1.35	-2.0	1	1095	K/K	BTS/
66	CHU-9	9/25/00	1152	3.0-3.1	-30.0	9/24/00	1140	3.0	-6.5	13	1187	K/K	BTS/
67	LJE-9	9/25	1230	2.8 3.0	-30.0	9/24/00	1225	3.4	-5.7	5	1139	K/PC	GR/
68	PMS-9	9/25	1315	3.3-3.0	-70.0	9/24/00	1310	3.0	-9.5	12	1183	K/K	BTS/
69	SES-9	9/25	1345	3.2-3.0	-30.0	9/27/00	1350	3.0	-5.9	10	1072	K/K	GR/
70	SAL-10-FR2	9/26	0925	3.0 2.8-3.0	-28.0	9/27/00	0900	3.15	-7.0	4	1165	C/C	RJR/
71	SAL-10D	9/26	0930	3.17-3.0	-29.0	9/27/00	0900	3.0	-9.2	15	1134	C/C	BTS/
72	OAS-10	9/26	1050	3.2-3.0	-28.0	9/27/00	1016	2.75	-3.2*	1	1081	K/C (* Low Slight Low)	BTS
73	OAS-10	9/26	1055	3.0	-70.0	9/27/00	1020	3.24	-8.0	2	1167	K/C	BTS
74	CHU-10	9/26	1150	3.0	-30.0	9/27/00	1115	3.3	-8.5	9	1176	K/C	GR
75	CHU-10D	9/26	1155	3.0	-30.0	9/27/00	1120	1.7	-8.8	13	1148	K/C	GR
76	LJE-10	9/24/00	1225	3.3-3.0	-30.0	9/27/00	1225	3.0	-8.5	5	1157	PC/C	GR BTS
77	LJE-10D	9/26/00	1230	3.2-3.0	-30.0	9/27/00	1229	0	-0.5	6	1122	PC/C OK last week??	GR BTS
78	PMS-10	9/24/00	1315	3.4-3.0	-30.0	9/27	1315	3.1	-7.7	11	1102	K/C	GR
79	PMS-10D	9/24/00	1320	2.8-3.0	-30.0	9/27/00	1315	2.8	-8.5	12	1184	K/C	GR
80													

SAMPLE FIFTH LOG SHEET
 Ca tters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
80	SES-10	9/26/00	1355	3.0	-30.0	9/27/00	1350	3.35	-6.0	10	1088	K/C	JA
81	SES-10D	9/26/00	1355	3.2-3.0	-29.0	9/27/00	1355	3.17	-6.0	14	1090	K/C	JA
82	SAL-11	9/27/00	0905	3.0	-29.0	9/28/00	0835	3.25	-7.0	4	1153	C/K	JA BTS
83	SES OAS-11	9/27/00	1025	3.03	-30.0	9/28/00	0955	3.0	-8.0	2	1150	C/K	BTS
84	CHU-11	9/27/00	1125	3.0	-30.0	9/28/00	1105	3.2	-8.5	9	1062	C/K (WINDY)	JA
85	LTE-11	9/27/00	1235	3.0	-30.0	9/28/00	1205	2.8	-10.0	5	1097	C/K (WINDY)	BTS
86	PMS-11	9/27/00	1320	3.2-3.0	-30.0	9/28/00	1300	3.0	-8.0	11	1108	C/K (WINDY)	JA
87	SES-11	9/27/00	1400	3.1-3.0	-29.0	9/28/00	1340	3.2	-7.0	10	1196	C/K	BTS
88	TRE Spike	9/28/00	←								1073	TRIP SPIKE	BTS
89	SAL-12	9/28/00	0837	3.03	-30.0	9/29/00	0807	3.5	-7.5	4	1075	K/K	BTS
90	OAS-12	9/28/00	1000	3.00	-30.0	9/29/00	0930	3.3	-9.0	2	1059	K/PC	BTS
91	CHA-12	9/28/00	1112	3.00	-30.0	9/29/00	1040	3.1	-8.0	9	1060	K (WINDY) / K	BTS
92	LTE-12	9/28/00	1212	3.00	-30.0	9/29/00	1142	3.0	-8.0	5	1080	K (WINDY) / K	BTS
93	PMS-12	9/28/00	1305	3.0	-30.0	9/29/00	1235	3.0	-8.0	11	1055	K/K	BTS
94	SES-12	9/28/00	1345	3.0	-30.0	9/29/00	1315	3.0	-7.0	10	1152	K/K	BTS
95													
		END OF				THIRD				WEEK.			

SAMPLE FIFTEEN LOG SHEET
 Calculators
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather, K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
80	SAL-13	10.2.00	0820	3.2-3.00	-29.8	10.3.00	8:10	3.18	-2.0	4	1143	C/C	KS/RB
81	OAS-13	10.2.00	0945	3.4-3.08	-30.0	10.3.00	9:10	3.15	-10.0	2	1144	C/C	KS/RB
82	CHU-13	10.2.00	1025	3.2-3.00	-30.0	10.3.00	10:20	3.23	-9	9	1147	C/C	KS/RB
83	LJE-13	10.2.00	11:00	3.1-3.0	-30.0	10.3.00	11:00	3.08	-8.5	5	1100	C/K	RB/KS
84	PMS-13	10.2.00	11:40	3.4-3.0	-30.0	10.3.00	11:52	2.65	-12	11	1154	C/K	RB/KS
85	SES-13	10.2.00	12:10	3.1-3.0	-30.0	10.3.00	12:25	3.0	-6.0	10	1064	C/K	RB/KS
101	SAL-14	10.3.00	0810	3.00	-30	10.4.00	08:20	3.5	-7.0	4	1069	C/C	KS/RB
102	SAL-14D	10.3.00	0810	3.14-3.0	-28	10.4.00	08:20	3.1	-8.0	15	1126	C/C	KS/RB
103	OAS-14	10.3.00	0915	3.05	-30	10.4.00	09:20	3.1	-8.0	2	1068	C/C	KS/RB
104	CHU-14	10.3.00	1025	3.00	-30	10.4.00	10:25	3.2	-8.0	9	1101	C/C	KS/RB
105	CHU-14D	10.3.00	1025	3.6-3.0	-30	10.4.00	10:25	2.8	-11.0	13	1169	C/C	KS/RB
106	LJE-14	10.3.00	11:05	3.00	-29	10.4.00	11:10	2.8	-8.5	5	1097	K/K	KS/RB
107	LJE-14D	10.3.00	11:05	3.00	-30	10.4.00	11:10	3.2	-9.0	6	1137	K/K	KS/RB
108	PMS-14	10.3.00	11:55	2.5-3.0	-30	10.4.00	12:00	3.0	-10.0	11	1157	K/C	KS/RB
109	PMS-14D	10.3.00	11:55	3.0	-30	10.4.00	12:00	2.6	-7.5	12	1091	K/C	KS/RB
110	SES-14	10.3.00	12:30	3.0	-30	10.4.00	12:40	3.2	-6.0	10	1114	K/C	RB/KS
111	SES-14D	10.3.00	12:30	3.0	-30	10.4.00	12:40	3.2	-6.0	14	1163	K/C	RB/KS

SAMPLE FIP LOG SHEET
 Ca tters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
112	SAL-15	10.4.00	0828	3.4	-29.4	10.5.00	08:28	3.3	-7.5	4	1148	C/C	R/KS
113	OAS-15	10.4.00	0920	3.4	-30.4	10.5.00	0920	3.1	-1.4	2	1061	C/C	R/KS
114	OAS-15	10.4.00	0920	3.4	-29.4	10.5.00	0920	3.1	-8.7	15	1123	C/C	R/KS
115	CHU-15	10.4.00	10:15	3.4	-30.4	10.5.00	10:15	3.2	-9.4	9	1085	C/C	R/KS
116	LSE-15	10.4.00	11:20	3.8-3.6	-30.4	10.5.00	11:10	3.4	-9.4	5	1131	K/PC	R/KS
117	PMS-15	10.4.00	12:10	3.4	-30.4	10.5.00	12:10	3.4	-11.4	11	1094	C/K	R/KS
118	SES-15	10.4.00	12:40	3.4	-29.4	10.5.00	12:30	3.4	-7.4	10	1162	C/K	R/KS
119	SAL-16	10.5.00	08:25	3.4	-28.4	10.6.00	08:05	3.1	-7.5	4	1076	C/C	R
120	OAS-16	10.5.00	0920	3.4	-30.4	10.6.00	08:55	3.1	-10.4	2	1052	C/C	R
121	CHU-16	10.5.00	10:15	3.2-3.4	-30.4	10.6.00	09:30	3.1	-10.5	9	1086	C/C	R
122	LSE-16	10.5.00	11:10	3.4	-30.4	10.6.00	10:40	3.1	-9.4	5	1145	PC/C	R
123	PMS-16	10.5.00	12:00	2.8-3.4	-30.4	10.6.00	11:40	3.4	-9.4	11	1124	K/C	R
124	SES-16	10.5.00	12:30	2.9-3.4	-30.4	10.6.00	12:05	3.1	-7.4	10	1065	K/C	R
125	REMARK										1166		R
126	SAL-17	10/10/00	0738	3.00	-28	10/11/00	0720	0.1	-25	4	1098	C/R water in controller	WRP JRR
127	OAS-17	10/10/00	0842	3.00	<-30	10/11/00	0848	0.1	-25	2	1158	C/R see part water in controller	JRR JRR
128	CHU-17	10/10/00	0931	3.0 ±0.5	<-30	10/11/00	0944	2.6	-11.6	9	1111	C/R windy	WRP WRP

SAMPLE FIF LOG SHEET
 Caeters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
129	LJE-17	10/10/00	1005	3.00	-29	10/11/00	1024	2.98	-9.5	5	1146	C/R	JRR JRR
130	PMS-17	10/10/00	1045	3.00	-29	10/11/00	1111	2.85±.05	-10	11	1050	C/R	JRR JRR
131	SES-17	10/10/00	1113	3.0±.05	-29	10/11/00	1139	2.89	-8	10	1070	C/R	SRR JRR
132	SES-17D	10/10/00	1129	New 3.0±.05	-30	10/11/00	1148	3.06	-6.5	1 ^{new}	1112	C/R Tried repaired controller 19588 MFM = 2.8	JRR JRR
133	SAL-18	10/11/00	0742	New controller 3.03	-28	10/12/00	0733	3.00	-6.5	14	1127	C/R 19588 = 3.66 19584 = 3.04	JRR JRR
134	SAL-18D	10/11/00	0756	3.21-3.03	-29	10/12/00	0741	3.04	-10	15	1106	C/R	SRR JRR
135	OAS-18	10/11/00	0907	clean water 3.0±.05	<-30	10/12/00	0842	2.40	-13	2	1164	Abnormal controller has no flow [water out]	JRR JRR
136	CHU-18	10/11/00	0949	3.0±.05	<-30	10/12/00	0933	3.20	-8.8	9	1077	C/R	JRR JRR
137	CHU-18D LJE	10/11/00	0957	3.00	<-30	10/12/00	0941	0.0	-28.5	13	1089	C/R Cleaned water into top of controller. Still no flow. Demand control	JRR JRR
138	LJE-18	10/11/00	1026	2.8-3.00	-30	10/12/00	1021	3.00	-8.5	5	1179	C/R	JRR JRR
139	LJE-18D	10/11/00	1030	3.0-3.00	<-30	10/12/00	1027	0.0	0.0	6	1051	C/R Suspect fitting not tight.	SRR JRR
140	PMS-18	10/11/00	1113	2.8-3.00	-30	10/12/00	1115	2.25	-9.5	11	1054	C/R	JRR JRR
141	PMS-18D	10/11/00	1118	3.0±.05	<-30	10/12/00	1123	2.0±.05	-6.5	12	1186	C/R	JRR JRR
142	SES-18	10/11/00	1143	2.8-3.00	-29	10/12/00	1147	2.72	-6	10	1174	C/R	JRR JRR
143	SAL-19	10/12/00	0739	3.00	-28	10/13/00	0731	2.92	-6.5	14	1078	C	JRR JRR
144	OAS-19	10/12/00	0845	2.8-3.00	<-30	10/13/00	0825	2.60	-13.5	2	1185	C Suspect controller 3.5H has 3.0 no water 2.5H has 3.0 no water	JRR JRR
145	OAS-19D	10/12/00	0852	2.9-3.00	-29.5	10/13/00	0829	3.13	-9	15	1177	C	JRR JRR

SAMPLE FIF LOG SHEET
 Ca iers
 Project 00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
146	CHU-19	10/12/00	0937	3.00 ^{±.05}	<-30	10/13/00	0920	3.5	-8.5	9	1113	C	JRR JRR
147	LJE-19	10/12/00	1024	3.0±.05	<-30	10/13/00	0948	3.2	-9.5	5	1138	C	JRR JRR
148	LJE-190 ^{2nd}	10/12/00	1036	3.6 - 2.99	<-30	10/13/00	0951	2.9	-5.5	6	1092	C Run and collected due to last O ₂ comp. issue	JRR JRR
149	PMS-19	10/12/00	1119	2.3-3.0	<-30	10/13/00	1026	3.24	-8	11	1105	C	JRR JRR
150	SES-19	10/12/00	1151	2.8-3.0 ^{±.05}	-30	10/13/00	1052	3.00	-3	10	1172	C	JRR JRR
151	Field Blank	10/12/00	1170	—	—	—	—	—	—	—	1170	C Field Blank	JRR
152	SAL-20	10-16-00	0900	3.1 - 3.0	-29.0	10-17-00	0830	2.7	-8.5	14	1135	K/K	B B
153	OAS-20	10-16-00	1010	3.0 - 3.0	-29.0	10-17-00	0930	3.0	-8.5	4	1059	K/K	B B
154	OAS-20D	10-16-00	1010	3.0	-30.0	10-17-00	0930	3.0	-9.0	15	1130	K/K	B B
155	CHU-20	10-16-00	1045	3.0	-30.0	10-17-00	1030	3.0	-9.0	9	1100	K/K	B B
156	LJE-20	10-16-00	1115	3.0	-30	10-17-00	1115	2.9	-9.0	5	1143	K/K	B B
157	LJE-20D	10-16-00	1115	3.0	-30	10-17-00	1115	3.0	-7.5	6	1148	K/K	B B
158	PMS-20	10-16-00	1200	3.3 - 3.0	-30	10-17-00	1220	3.0	-9.0	11	1104	K/K	B B
159	PMS-20D	10-16-00	1200	3.0	-30	10-17-00	1220	3.2	-7.5	12	1093	K/K	B B
160	SES-20	10-16-00	1230	2.8 - 3.0	-30	10-17-00	1245	1.2	-2.0	10	1150	K/K * FLARED Low CAN PRESS.	B B
161	SES-20D	10-16-00	1230	2.8 - 3.0	-30	10-17-00	1248	3.1	-4.0	1	1196	K/K	B B

SAMPLE FIF LOG SHEET
 Counters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
162	SAL-21	10.17.00	0830	2.4- 3.0	-28.5	10.18	0810	3.0	-5.5	14	1134	K/C	B/B
163	OAS-21	10.17.00	0935	3.0	-29.0	10.18	0915	3.0	-6.0	4	1081	K/C	B/B
164	CHU-21	10.17.00	1035	3.0	-30.0	10.18	1005	3.4	-8.5	9	1053	K/C	B/B
165	CHU-21D	10.17.00	1035	3.0	-30.0	10.18	1005	3.2	-8.0	15	1141	K/C	B/B
166	LJE-21	10.17.00	1125	2.8- 3.0	-30.0	10.18	1120	3.0	-8.0	5	1066	K/K	B/B
167	PMS-21	10.17.00	1230	2.8- 3.0	-30.0	10.18	1205	3.0	-7.5	11	1099	K/K	B/B
168	SES-21	10.17.00	1250	3.0	-30	10.18	1230	3.1	-5.0	10	1072	K/K	B/B
✓169	SAL-22	10.18.00	0815	3.1- 3.0	-27.0	10.19	0740	2.93	-6.0	14	1095	C/C	B/BJS
✓170	SAL-22D	10.18.00	0815	3.3- 3.0	-30	10.19	0745	2.63	-14.0	6	1153	C/C	B/BJS
✓171	OAS-22	10.18.00	0920	3.0	-28.0	10.19	0856	3.0	-7.5	4	1183	C/C	B/BJS
✓172	CHU-22	10.18.00	1015	3.3- 3.0	-30	10.19	0950	3.3	-10.0	9	1088	C C	B/BJS
✓173	LJE-22	10.18.00	1125	3.3- 3.0	-30	10.19	1030	3.0	-10.0	5	1187	K/C	B/BJS
✓174	PMS-22	10.18.00	1205	3.3- 3.0	-30	10.19	1120	3.0	-8.0	11	1176	K/K	B/BJS
✓175	SES-22	10.18.00	1230	3.2- 3.0	-30	10.19	1150	3.0	-5.0	10	1100	K/K	B/BJS
✓176	TRIP	10.18.00	BLANK	CANCEL			HAD TO USE			N/A	1165	N/A	BJS

SAMPLE FIFTEEN SHEET
 Ca. ters
 Project 00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
176	SAL23F53	10/19/00	0753	2.7 3.0	-29.5	10/20/00	0715	3.3	-9.0	6	1083	C/C	RTJ/RTJ
177	SAL23D2	10/19/00	0748	2.84 3.00	-28.0	10/20/00	0717	3.2	-6.0	14	1165	C/C	RTJ/BJS
178	OAS23	10/19/00	0900	2.90 3.1	-28.0	10/20/00	0815	3.1	-7.0	4	1184	C/C	BTJ/RTJ
179	CHU23	10/19/00	0953	3.0	-32.0	10/20/00	0906	3.3	-10.0	9	1181	C/C	BTJ/RTJ
180	LJE23	10/19/00	1035	3.0	-30	10/20/00	0937	2.6	-12.5	5	1073	C/C	BTJ/RTJ
181	PM523	10/19/00	1125	3.0	-30	10/20/00	1027	3.2	-7.0	11	1090	K/PC	BTJ/RTJ
182	SES23	10/19/00	Noon	3.1 3.0	-30	10/20/00	1102	3.35	-6.0	11	1132	K/PC	BTJ/RTJ
183	TS#3	←											RTJ
184	SAL-24	10/23/00	0735	2.8-3.0	-27.4	10/24/00	0728	2.4	-4	14	1166	K+Cool	JRR
185	OAS-24	10/23/00	0828	3.2-3.0	-27	10/24/00	0825	3.0	-6.5	4	1110	K+Cool	JRR
186	CHU-24	10/23/00	0905	3.1-3.0	<-30	10/24/00	0908	3.0	-10	9	1065	K+Cool	JRR
187	LJE-24	10/23/00	0936	2.6-3.0	-29.5	10/24/00	0941	2.7	-8	5	1085	K	JRR
188	PMS-24	10/23/00	1006	3.6-3.0	<-30	10/24/00	1017	2.7	-10	11	1086	K	JRR
189	SES-24	10/23/00	1028	3.1-3.0	-29	10/24/00	1040	2.95	-5.5	10	1064	K	JRR
190	SAL-25	10/24/00	0732	3.3-3.0	-30	10/25/00	0730	3.0	-12	6	1098	K	JRR
191	OAS-25	10/24/00	0831	3.3-3.0	-28.5	10/25/00	0828	2.9	-8	8	1145	K	JRR
192	CHU-25	10/24/00	0911	3.2-3.0	-29	10/25/00	0917	3.05	-8.5	15	1140	K	JRR

SAMPLE FIF LOG SHEET
 Calculators
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
193	LJE-25	10/24/00	0948	3.8-3.0	<-30	10/25/00	0954	1.9	-15.5*	3	1094	K C	JRR JRR
194	PMS-25	10/24/00	1021	3.1-3.0	<-30	10/25/00	1032	2.5	-6.5	12	1052	K	JRR JRR
195	SES-25	10/24/00	1045	3.3-3.0	-29	10/25/00	1111	3.2	-5	1	1124	K C	JRR JRR
196	SAL-26D	10/28/00	0734	3.0	-27.5	10/26/00	0730	2.4	-4.0	14	1146	C R, A	JRR KS
197	SAL-26	10/28/00	0733	3.0	<-30	10/26/00	0730	3.0	-11.5	6	1162	C R, A	JRR KS
198	OAS-26	10/25/00	0830	2.9-3.0	-29	10/24/00	0920	3.0	-7	8	1132	C, SHARES	JRR KS
199	OAS-26D	10/25/00	0833	2.9-3.0	-29	10/26/00	0921	2.8	-9	4	1178	C	JRR KS
200	CHU-26	10/25/01	0919	3.0	-29.5	10/24/00	1000	3.0	-7	15	1060	PC	JRR KS
201	CHU-26D	10/25/00	0920	2.9-3.0	<-30	10/24/00	1000	3.0	-7	9	1075	PC	JRR KS
202	LJE-26	10/25/00	0957	1.9-3.0	-30	10/26/00	1050	2.6	-10.5	3	1057	C Watch Controller	JRR KS
203	LJE-26D	10/25/00	1009	3.4-3.0	-30	10/26/00	1051	2.7	-10.5	5	1159	C	JRR KS
204	PMS-26	10/25/00	1035	3.3-3.0	-30	10/26/00	1137	2.8	-7.5	12	1126	C, R	JRR KS
205	PMS-26D	10/25/00	1037	3.1-3.0	-29	10/26/00	1135	3.0	-7	11	1079	C, R	JRR KS
206	SES-26	10/25/00	1113	3.2-3.0	-28	10/26/00	1205	3.1	-6	1	1163	C, R	JRR KS
207	SES-26D	10/25/00	1115	3.1-3.0	-27.5	10/26/00	1206	2.8	-3	10	1154	C, R	JRR KS
208	SAL-27	10/26/00	0830	3.0	<-30	10/27/00	0825	3.5	-12	6	1123	C, C	KS KS
209	OAS-27	10/26/00	0925	3.0	-29.6	10/27/00	0920	3.0	-8	4	1061	C, C	KS KS

SAMPLE FIELD LOG SHEET
 Califiers
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
210	CHH-27 #10-15	10.26.00	1005	3.2 3.0	-29.9	10.27.00	1000	3.0	-9.5	15	1107	C, R / C	KScotA
211	LTE-27	10.26.00	1055	2.5 3.0	-30	10.27.00	1050	3.1	-8	3	1144	C, R / C	KScotA
212	PMS-27	10.26.00	1140	3.0	-29.2	10.27.00	1130	3.0	-8	12	1131	C, R / C	KScotA
213	SES-27	10.26.00	1206	3.1	-29.4 -27	10.27.00	1200	2.9	-6	1	1068	C, R / C	KScotA
END of sampling													

SAMPLE FIF LOG SHEET
 Caltrans
 Project 00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments Weather K, PC, C, R F = Foggy	Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge				
214	SAL-28	10-30-00	0745	1.7-3.0	-27.5	10-31-00	0730	2.4	-5.5	14	1185	PC/K	B/B
215	OAS-28	10-30-00	0845	2.8-3.0	-28.0	10-31-00	0840	3.0	-7.5	4	1069	PC/K	B/
216	CHU-28	10-30-00	0945	3.2-3.0	-30.0	10-31-00	0930	3.0	-9.0	9	1186	C/K	B/
217	LJE-28	10-30-00	1030	3.0	-28.0	10-31-00	1030	3.0	-9.5	5	1080	C/K	B/
218	PMS-28	10-30-00	1115	3.3-3.0	-29.0	10-31-00	1115	2.5	-12.0	11	1100	R/K	B/
219	SES-28	10-30-00	1150	3.4-3.0	-27.0	10-31-00	1135	2.9	-7.5	10	1150	R/K	B/
220	SAL-29	10-31-00	0730	3.2-3.0	-29.5	11/1/00	0723	2.4	-7	14	1135	K/	K B/ LRR
221	OAS-29	10-31-00	0840	2.8-3.0	-28.0	11/1/00	0827	2.7	-6.5	4	1134	K/	K+F B/ LRR
222	CHU-29	10-31-00	0930	2.8-3.0	-30.0	11/1/00	0913	3.6	-7.5	9	1157	K/	K+F B/ LRR
223	LJE-29	10-31-00	1030	2.8-3.0	-30.0	11/1/00	0954	3.0	-10.5	5	1179	K/	K B/ LRR
224	PMS-29	10-31-00	1115	2.4-3.0	-30.0	11/1/00	1035	3.3	-8	11	1177	K/	K B/ LRR
225	SES-29	10-31-00	1135	2.9-3.0	-29.0	11/1/00	1106	2.2-3.0	-5.5	14	1113	K/	K B/ LRR
226	SAL-30	11/1/00	0729	2.5-3.0	-27.5	11/2/00	0743	2.2	-5	14	1106	K	F LRR LRR
227	SAL-30	11/1/00	0731	3.1-3.0	<-30	11/2/00	0749	3.1	-11.5	6	1127	K	F LRR LRR
228	OAS-30	11/1/00	0831	2.7-3.0	-27.5	11/2/00	0842	2.9	-7	4	1076	K+F	F LRR LRR
229	OAS-30	11/1/00	0834	3.3-3.0	-27.5	11/2/00	0845	3.0	-8	8	1089	K+F	F LRR LRR
230	CHU-30	11/1/00	0917	3.4-3.0	<-30	11/2/00	0925	3.2	-9	9	1138	K+F	F LRR LRR

SAMPLE FIF LOG SHEET
 Ca Filters
 Project C-00-028
 Ambient Monitoring for Mebr and Telone
 Monterey/ Santa Cruz Counties

Log #	Sample ID	Start				End				Flow Controller #	Silco Can #	Comments		Sampler's Initials
		Date	Time	Flowrate	Gauge	Date	Time	Flowrate	Gauge			Weather K, PC, C, R		
231	CHU-30D	11/1/00	0719	3.0	-28.5	11/2/00	0930	3.0	-8.5	15	1174	K+F	F	JRR JRR
232	LJE-30	11/1/00	0956	3.0	<-30	11/2/00	1000	2.7	-10	5	1143	K	K	JRR JRR
233	LJE-30D	11/1/00	0957	4.1-3.0	<-30	11/2/00	1006	2.6	-10.7	3	1148	K	K	JRR JRR
234	PMS-30	11/1/00	1037	3.0	-29	11/2/00	1037	2.9	-8	11	1130	K	R	JRR JRR
235	PMS-30D	11/1/00	1038	3.2-3.0	-30	11/2/00	1043	2.9	-9	12	1054	K	K	JRR JRR
236	SES-30	11/1/00	1110	3.2-3.0	-28	11/2/00	1109	3.0	-5.5	10	1077	K	K	JRR JRR
237	SES-30D	11/1/00	1112	3.0	-29	11/2/00	1114	2.9	-7	1	1111	K	K	JRR JRR
238	SAL-31	11/2/00	0746	3.3-3.0	-27.5	11/3/00	0747	2.5	-7	14	1050	F	K	JRR JRR
239	Field Spike SAL-31S	11/2/00	0752	3.0	-30	11/3/00	0749	3.0	-11.5	6	1108	F	K	JRR JRR
240	OAS-31	11/2/00	0846	2.8-3.0	-27.5	11/3/00	0841	2.5	-6.5	4	1112	F	K	JRR JRR
241	CHU-31	11/2/00	0928	3.0	<-30	11/3/00	0916	2.3	-10	9	1170	F	K	JRR JRR
242	LJE-31	11/2/00	1003	2.8-3.0	<-30	11/3/00	0943	3.1	-9	5	1172	K	K	JRR JRR
243	PMS-31	11/2/00	1040	2.8-3.0 3.0	<-30	11/3/00	1012	3.0	-7.5	11	1091	K	K	JRR JRR
244	SES-31	11/2/00	1111	3.0	-29	11/3/00	1027	3.0	-6	10	1087	K	K	JRR JRR
245	True Spike TH	11/2/00	1122	N.A.	?					N.A.	1196 1078	K		JRR JRR
246	True Blank	11/2/00	1120	N.A.	?						1078	K		JRR JRR

APPENDIX VII

1,3-DICHLOROPROPENE CHARCOAL TUBE
AMBIENT FIELD LOG SHEETS

1970

SAMPLE FIELD LOG SHEET

Project: Telone Air Monitoring in Monterey and Santa Cruz Counties

Charcoal Tubes

Project #: C00-028

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow (Lpm)	End Flow (Lpm)	Start Leak Check	End Leak Check	Start Count	End Count	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Initials
1	FS-1	9/11/00	0815	3.00	3.04	0	0	263.56	287.36	(Sample)	K	JRP
2	FS-2	9/12/00	0800	3.00	2.90	0	0	263.56	287.46	5-A	K	JRP
3	SAL-T1	9/12/00	0815	3.00	3.00	0	0	263.56	287.52	C-5	K	JRP
4	OAS-T1	9/12/00	0940	3.00	3.13	0	0	1174.27	1196.01	6A Rota	K	JRP
5	CHU-T1	9/12/00	1002	3.00	2.96	0	0	861.58	885.00	4-A	K	JRP
6	LJE-T1	9/12/00	1038	3.00	3.00	0	0	911.47	935.22	5-1	K/c	JRP
7	PMS-T1	9/12/00	1119	3.00	3.09	0	0	287.33	295.42	C-1	K/c	JRP
8	SES-T1	9/12/00	1155	3.00	2.93	0	0	1148.91	1171.99	1B	K/c	JRP
9	OAS-T2	9/13/00	0930	3.00	3.09	0	0	1196.02	1220.39	6A	c/pc	JRP
10	CHU-T2	9/13/00	1023	3.00	3.10	0	0	885.01	909.35	4A	c/pc	JRP
11	LJE-T2	9/13/00	1103	3.00	3.00	0	0	935.26	959.55	5-1	c/pc	JRP
12	PMS-T2	9/13/00	1150	3.00	2.90	0	0	295.46	317.00	C1	c/pc	JRP
13	SES-T2	9/13/00	1236	3.00	3.00	0	0	1171.92	1196.00	1B	c/pc	JRP
14	SALT3	9-13-00	0805	3.00	3.19	0	0	311.46	335.43	C-5	PC/c	JRP
15	SALT3D	9-14-00	0810	3.00	3.00	0	0	311.46	335.50	5-10	PC/c	JRP

SAL 2 missed

SAMPLE FIELD LOG SHEET

Project: Telone Air Monitoring in Monterey and Santa Cruz Counties

Charcoal Tubes

Project #: C00-028

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow (Lpm)	End Flow (Lpm)	Start Leak Check	End Leak Check	Start Count	End Count	Comments	Weather	Initials
											o=overcast pc=partly c=cloudy k=clear	
16	OAS-T3	9/13/00	0940	3.0	3.14	0	0	1220.52	1241	6A	pc/c	Q
17	OAS-T3D	9/13/00	0940	3.0	3.23	0	0	1220.52	1241	5-12	pc/c	Q
18	CH4-T3	9/13/00	1035	3.0	3.23	0	0	909.54	933.39	4A	pc/c	J
19	CH4-T3D	9/13/00	1035	3.0	3.27	0	0	909.54	933.40	3A	pc/c	J
20	LJE-T3	9-13-00	1105	3.0	3.06	0	0	959.65	984.44	5-1	pc/c	K
21	LJE-T3D	9-13-00	1105	3.0	3.05	0	0	959.65	984.48	5-3	pc/c	K
22	PM5-T3	9-13-00	1155	3.0	3.06	0	0	320.0	344.71	C1	c	/K
23	PM5-T3D	9-13-00	1155	3.0	3.21	0	0	320.0	344.80	C4	c	/K
24	SES-T3	9-13-00	1235	3.0	3.25	0	0	110.1	1221.15	1B	c	K
25	SES-T3D	9-13-00	1235	3.0	3.11	0	0	110.1	1221.22	5-2	c	K
26	SAL-T4	9-14-00	0815	3.0	3.04	0	0	335.08	359.30	C-5	c/o	/K
27	OAS-T4	9-14-00	0845	3.0	2.97	0	0	1242.37	1265.07	5-A	c/o	/K
28	CH4-T4	9/14/00	0930	3.0	3.08	0	0	933.49	956.75	4A	c/o	K
29	CH4-T4	9-14-00	1100	3.00	3.04	0	0	984.54	1007.62	5-1	c/K	K
30	PM5-T4	9/14/00	1245	3.00		0		344.86		C-4	c/	K

Project: Telone Air Monitoring in Monterey and Santa Cruz Counties

Charcoal Tubes

Project # : C00-028

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APPENDIX VIII

METHYL BROMIDE CHARCOAL TUBE
AMBIENT FIELD LOG SHEETS

SAMPLE FIELD LOG SHEET

Project: Methyl Bromide Ambient Sampling in Monterey & Santa Cruz Counties

Project #: C00-028

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow ()	End Flow ()	Start Leak Check	End Leak Check	Start Count	End Count	Comments	Weather	Initials
											o=overcast pc=partly c=cloudy k=clear	
1	SAL-1	9/25/00	1000									
		9/26/00	0925	5.0	7.0			35933	38269	E2	K/C	W/A
2	SAL-FS1	9/25	1000									
		9/26/00	0930	5.1	6.5			35933	38270	E8	K/C	W/A
3	SAL-FS2	9/25	1000									
		9/26	0935	5.0	9.0			35933	38274	E9	K/C	W/R
4	OAS-1	9/25	1116	5.1	5.2			126593	128936	E6	K/K	BJS
		9/26	1045									
5	CHA-1	9/25	1200									
		9/26	1135	5.2	8.7			95680	98038	F3	K/K	W/A
6	LJE-1	9/25	1230									
		9/26	1220	5.0	6.3			124918	127299	E1	K/K	BJS
7	PMS-1	9/25	1315									
		9/26	1310	5.0	5.5			60873	63267	F1	K/K	W/A
8	SES-1	9/25	1345									
		9/26	1345	5.0	6.0			148544	150972	E4	K/K	BJS
9	SAL-2	9/26	0945	5.1	6.2							
		9/27	0950					38307	40623	E8	C/C	W/A
10	SAL-FS3	9/26	0950	5.0	4.5							
		9/27	0905					38316	40641	E2	C/C	BJS
11	SAL-FS4	9/26	0950	5.1	5.69							
		9/27	0910					38317	40652	E3	C	W/A
12	OAS-2	9/26	1050									
		9/27	1020	5.0	6.1			128950	131295	E6	C/C	W/A
13	OAS-2D	9/26	1100	5.0	8.3							
		9/27	1120					128960	131300	E7	C/C	W/A
14	CHA-2	9/26	1145	5.0	5.1							
		9/27	1112					98058	100409	F3	K/C	BJS
15	CHA-2D	9/26	1150	5.0	5.4							
		9/27	1119					98063	100409	F4	K/C	BJS
16	LJE-2	9/26	1200	5.0	5.2							
		9/27	1230					127514	129708	E1	K/C	BJS

AIR RESO'
MLD/1

JARD
3

Log Sheet Temp

SAMPLE FIELD LOG SHEET

Project: Methyl Bromide Ambient Sampling in Monterey & Santa Cruz Counties

Project #: C00-028

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow ()	End Flow ()	Start Leak Check	End Leak Check	Start Count	End Count	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Initials
17	LJE 2D	9/26	12:20	5.0	5.3			12734	129710	B9	K/C	BJS
18	PMS 2	9/26	13:15	5.0	12.6			63277	65669	F2	K/C	BJS
19	PMS 2D	9/26	13:20	5.0	7.9			63288	65677	F1	K/C	BJS
20	SES 2	9/26	13:50	5.0	5.2			150955	153352	F4	K/C	BJS
21	SES 2D	9/26	13:55	5.0	5.8			150957	153353	F5	K/C	BJS
22	SAL 13	9/27	09:15	5.0	5.5			40660	43007	E8	C/K	BJS
23	SAL 13D	9/27	09:20	5.1	5.3			40667	43019	E9	C/K	BJS
24	OAS-3	9/27	09:30	5.0	5.5			131340	133634	E6	C/K	BJS
25	CHA 3	9/27	11:22	5.0	6.8			100415	102802	F4	C/K	BJS
26	LJE-3	9/27	12:45	5.1	5.5			121735	132087	E1	C/K	BJS
27	PMS-3	9/27	13:25	5.0	5.3			65687	68058	F1	C/K	BJS
28	SES-3	9/27	14:00	5.0	5.0			153365	155742	F4	C/K	BJS
29	SAL 4	9/27	08:55	5.0	5.3			43025	45376	E8	K/K	BJS
30	OAS 4	9/27	09:40	5.0	1.0			133685	136031	E6	K/PC	BJS
31	CHA 4	9/27	11:15	5.0	4.5			102809	105155	F4	K/K	BJS
32	LJE 4	9/27	11:50	5.0	5.6			132090	134445	E1	K/K	BJS

Project: Methyl Bromide Ambient Sampling in Monterey & Santa Cruz Counties

[illegible]